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Planning and Engineering Guide

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Chapter 1: Introduction

Overview

Symposium OPEN IVR 4.0 combines up to four Multimedia Resource Units (MRS) with one or two general-purpose Application Processor s (APs) to provide a versatile application development and/or runtime environment. The MRS provides the information-processing environment (that is, voice, fax, voice-recognition, text-to-speech) and the telco network interfaces. The AP provides the environment for the development of IVR applications and the management/control of the IVR product.

Symposium OPEN IVR 4.0 is available on unfolded and folded configurations. An unfolded system consists of an AP and MRS on separate servers. Up to two APs and four MRSs can be connected.

A folded system combines the AP and MRS onto one server called an MRS/AP. No additional MRSs can be added to an MRS/AP.

Purpose

The purpose of this document is to specify the valid configurations, the supported limits, the system performance and response-time characteristics of Symposium OPEN IVR 4.0. This document also provides a set of rules and guidelines for the configuration of the Symposium OPEN IVR 4.0 product.

Release 4.0 hardware

OPEN IVR 4.0 hardware uses an SCbus. When Symposium OPEN IVR 4.0 is installed on new systems, only Nortel's 300tp, 700tp, and 1000rp hardware platforms are used.

- 300tp acts as an AP or an MRS/AP.
- 700tp acts as an AP, an MRS/AP or an MRS/Tower.
- 1000rp acts as either an MRS/Rack or a Rack AP.

As with the Symposium OPEN IVR 2.01 or 2.5 hardware platforms, LAN connections are either Token Ring or Ethernet.

In this manual, the Release 4 hardware is identified as follows:

- Tower AP (300tp/700tp))
- MRS/AP (300tp/700tp)
- MRS/Tower
- MRS/Rack
- Rack AP

Releases 2.01 and 2.5 hardware

When Symposium OPEN IVR 4.0 is installed on the existing OPEN IVR 2.01 or 2.5 hardware platforms, the existing 2.01 or 2.5 hardware is used. OPEN IVR 2.x hardware used a PEB bus. This hardware can be upgraded to run OPEN IVR 4.0 software.

In this manual, the Release 2.x hardware is identified as follows:

- R2 AP
- R2 MRS/AP
- R2 MRS/Tower
- R2 MRS/Rack

Symposium OPEN IVR 4.0 documentation

The following additional information about Symposium OPEN IVR 4.0 is available on the documentation CD-ROM.

Document	NT number/ A0 number
Symposium OPEN IVR 4.0 Getting Started Guide	NTVE8201 A0732100
Symposium OPEN IVR 4.0 Product Guide	NTVE8202 A0732101
Symposium OPEN IVR 4.0 System Administration Guide	NTVE8203 A0732102
Symposium OPEN IVR 4.0 Application Development Guide	NTVE8209 A0732108
Symposium OPEN IVR 4.0 Cell Catalog	NTVE8208 A0732107
Symposium OPEN IVR 4.0 Installation, Upgrade, and Maintenance Guide	NTVE8202 A0732103
Symposium OPEN IVR Planning and Engineering Guide	NTVE8205 A0732104
Symposium OPEN IVR 4.0 Error Messages Guide	NTVE8206 A0732105
Symposium OPEN IVR 4.0 Web Option Guide	NTVE8210 A0732109
Symposium OPEN IVR 4.0 SQL Server User Guide	NTVE8216 A0732115
Symposium OPEN IVR 4.0 Service Console Interface Reference Manual	NTVE8207 A0732106
Symposium OPEN IVR 4.0 VT100 Host Connectivity Configuration and Development Guide	NTVE8221 A0732120
Symposium OPEN IVR 4.0 Text-to-Speech Option Guide	NTVE8213 A0732112
Symposium OPEN IVR 4.0 Speech Recognition Option Guide	NTVE8212 A0732111

Document	NT number/ A0 number
Symposium OPEN IVR 4.0 Fax Option Guide	NTVE8211 A0732110
Symposium OPEN IVR 4.0 CAS and ISDN Signaling Option Guide	NTVE8214 A0732113
Symposium OPEN IVR 4.0 Integration Package for Meridian Link User Guide	NTVE8215 A0732114
Symposium OPEN IVR 4.0 Prompt Import Utility Guide	NTVE8218 A0732117
Symposium OPEN IVR 4.0 SNA Host Communications Guide	NTVE8227 A0732774

Chapter 2: Hardware description

Overview

The Symposium OPEN IVR 4.0 product is comprised of a telephony platform, and an administration and application development platform. The telephony platform is the Multimedia Resource Server (MRS). The administration and application development platform is the Application Processor (AP). The MRS and the AP are connected via a LAN. The MRS and the AP can be combined into one physical platform known as the MRS/AP.

The hardware for all existing OPEN IVR 2 x platforms is based on PCM Expansion Bus (PEB). Existing OPEN IVR 2.x AP can have its software upgraded to Symposium OPEN IVR 4.0. All previous features of the R2 AP will continue to be supported. Symposium OPEN IVR 4.0 introduces the 700tp as the new platform for the Tower AP (and MRS/AP).

Existing OPEN IVR 2.x MRS/AP can also have its software upgraded to Symposium OPEN IVR 4.0. The R2 MRS/AP continues to support telephony hardware based on PEB. All previous features of the R2 MRS/AP will continue to be supported, but some new features will not be offered on PEB as they have been engineered and tested for SCbus operation only (such as Line Side E1, GammaLink, and PureSpeech). Symposium OPEN IVR 4.0 introduces the 700tp as the new platform for the MRS/AP (and AP). The 700tp MRS/AP operates in SCbus mode only.

Existing OPEN IVR 2.x MRS/Tower and MRS/Rack support telephony functions via PEB. All previous features will continue to be supported, but some new features will not be offered on PEB as they have been engineered and tested for SCbus operation only. New MRSs will be introduced in Symposium OPEN IVR 4.0, using 700tp and 1000rp as the tower and rack base platforms respectively. Instead of using PEB, these new MRS platforms support telephony functions via SCbus.

Platform hardware

R2 AP and MRS/AP (700t)

The R2 AP and MRS/AP platform has the following characteristics:

- Intel Magellan Tower Chassis
- Onboard Super VGA Video Controller with one Mbyte of Video DRAM and maximum resolution of 1024 by 768 with 256 colors
- PS/2-style keyboard and mouse connectors
- 8 bus master slot(2 PCI/ 5 EISA and 1 hybrid) system baseboard
- Onboard Adaptec AIC-7870 twin channel PCI SCSI-2 controller
- Pentium 75, 100, or 133MHz CPU Module
- One parallel port and two 9-pin serial ports
- 64 Mbytes of base system memory
- 256 kbytes of cache
- 2.5 Gbyte SCSI 1/2” Cartridge Tape Drive
- 3.5" Floppy Drive
- 4.5 Gbyte fast-wide SCSI-2 Hard Drive (hot swap)
- 525 Watt AC power supply
- Parallel port keylock
- Monitor (14”, 17” or 21”)
- Mouse
- 32x SCSI CDROM drive
- 4 Gbyte SCSI DAT drive (optional)

Intel Magellan tower chassis

The 29" high chassis (MAG5000) houses eight l/O expansion slots, eleven peripheral bays, and a 525 watt auto-ranging power supply. The chassis is fabricated using electro-galvanized (EG) metal to minimize EMI/RFI. Easy access to the interior system baseboard, processor module(s), memory module(s) and any add-in cards is provided by two thumbscrews on the side panel. A front door opens to access the hot-swap drive array for easy replacement of the SCSI-2 hard drives. A side cover lock loop is available to secure the side panel. The MAG5000 server chassis is designed to house either the 15" or 12" system baseboard.

The chassis has six internal 3.5" hard drive bays. The six bays have been designed to allow easy setup of Redundant Array of SCA-compatible backplane. Four external 5.25" half height bays are available for backup or removable media devices. The standard MAG5000 configuration incorporates a 3.5" Teac FD235HF 217-U floppy disk drive, which supports both 720 KB and 1.44-Mbyte media density.

The front cover on the MAG5000 Premium server provides access to the four external peripheral bays, the 3.5" floppy drive, system reset switch, and power-on/off. Three LEDs display system activity: a yellow LED for IDE or SCSI hard disk activity, a red LED for a SCSI failure, and a green LED for system power-on. The MAG5000 front panel is protected by a mechanically lockable front door. A key from Intel, which is unique for every system, is available for both the front panel and side chassis locks.

The Delta 525 auto-ranging power supply automatically switches between 110V and 220V AC inputs, supporting use in all parts of the world requiring a switch change. The power supply has three DC peripheral connectors for the accessible drive bays; two mini-output connectors for use with 3.5" floppy drives and one TTL output connector for use with 5.25" peripherals or a 3.5" hard drive. A separate connector provides power directly to the SCSI-2 SCA Backplane.

The power supply fan transfers air at a rate of 250-300 linear feet/minute (35 cfm) from the exhaust port to cool the baseboard and peripherals. In order to provide additional cooling with minimum noise, a variable speed fan (maximum 100 cfm) also helps cool the chassis interior. The fan speed is determined by the air temperature and the number of hard drives in the bottom peripheral bays. This fan is monitored for a drop in RPMs based on an internal temperature increase. If necessary, the fan can be "hot-swapped" without bringing down the server system. The MAG5000 is pressurized internally to allow needed air flow across all drive bays. Operating with the side cover or processor compartment panel removed disrupts the air flow and will affect long term reliability.

The MAG5000 Premium Server system is designed for easy installation, upgradability and maintenance of the disk, processor, memory and I/O subsystems. The SCSI-2 SCA Backplane minimizes cabling for power and control from disk controllers and the power supply to the drive bays and contains a SCSI-2 port for any external SCSI drives. The Adaptec AIC-7870 SCSI-2 controller integrated on the system baseboard eliminates the need to install SCSI controllers in the expansion slots.

Altair motherboard

Symposium OPEN IVR 4.0 will use an Intel ALTServer System. The processor and memory subsystems reside on a conventional motherboard. The ALTServer design uses members of the Intel 82430 Neptune PCI chipset. Two* Zero Insertion Force (ZIF) sockets for Pentium processors provide CPU scalability.

Note: Symposium OPEN IVR 4.0 supports only a single CPU.

Performance upgrades are available through a variety of plug-in cache module options. The ALTServer's expansion capabilities meet the needs of file and application servers for high performance I/O by providing a combination of PCI local bus and EISA connectors. The baseboard offers two dedicated PCI slots, five dedicated EISA slots, and one shared PCI/EISA slot. The PCI local bus offers burst transfers at 133 MB per second and has been a proven high-speed solution on the desktop. This combination of PCI and EISA expansion offers continuing support for existing special function EISA add-in boards. All of the add-in slots are available to the user because the high-performance PCI fast SCSI-2 interface and a PCI graphics controller are integrated on the baseboard. A number of security, reliability, and management features also have been incorporated into the ALTServer's design to meet vital server needs.

Pentium processors

The ALTServer baseboard is designed to operate with 75 MHz, 90 MHz, 100 MHz, 120 MHz, 133 MHz or 166 MHz Pentium processors and is shipped with a single processor installed in the ZIF socket. The Pentium processor is backward-compatible with the Intel 486 processor. The Pentium processor supports both read and write burst mode bus cycles and includes a 16 KB on-chip cache core (8 KB for code and 8 KB for data caches) employing a write-back policy. Also integrated into the Pentium processor is an advanced numeric coprocessor which significantly increases the speed of floating point operations, while maintaining backward compatibility with the i486DX math coprocessor and complying with ANSI/IEEE standard 754-1985. Based on 0.6 micron processes, the Pentium processor is powered by 3.3 volts and supports Intel's System Management Mode (SMM) power-management operation.

> ***Note:*** Symposium OPEN IVR 4.0 supports existing system with Pentium CPUs: 75, 100, and 133MHz. Defective CPUs in the field will be replaced by Pentium 133MHz.

Second level (L2) cache

The ALTServer offers an upgradable second level cache using Integrated Device Technology (IDT) or Corsair cache devices. This provides five options and price performance points: No cache, 256 KB or 512 KB asynchronous cache, 256 KB or 512 KB Burst Synchronous cache.

> ***Note:*** Symposium OPEN IVR 4.0 supports 256KB of burst synchronous cache.

The performance of each option depends on many factors, such as operating system, number of processors, amount of system memory, and other variables. However, as a general rule, overall system performance increases with larger cache sizes. The use of a Burst Synchronous cache should provide even higher performance than the equivalent size Asynchronous cache device.

The second level cache may be *Enabled* or *Disabled* using the BIOS Configuration Utility. When Enabled, the caching policy is always write-back mode to support the internal (L1) 16 KB cache of the Pentium processor. With a burst cache device installed, the processor read and write clock latencies are 3-1-1-1.With the Asynchronous modules, the processor read latency is 4-2-2-2 and the write latency is 3-1-1-1.

Note: Second level cache is enabled in Symposium OPEN IVR 4.0.

System memory

The main system memory is provided with eight 72-pin SIMM sockets for up to 256 Mbytes of memory expansion on the baseboard. The eight 90' angled sockets support 256K x 36 (1 Mbyte), 512K x 36 (2 Mbytes), 1 x 36 (4 Mbytes), 2M x 36 (8 Mbytes), 4M x 36 (l6 Mbytes), and 8M x 36 (32 Mbytes) SIMMs. The minimum memory size is 2 Mbytes and the maximum memory size, using eight 32-Mbyte SIMMs, is 256 Mbytes. Memory timing requires 70 ns fast page devices. Parity generation/checking is provided for each byte.

The eight SIMM sockets are arranged as four banks (Bank 0, 1, 2 and 3) with each bank consisting of two sockets and providing a 64-bit wide data path and 8 parity bits. The memory array is controlled by the Intel 8434NX PCMC and data buffering is provided by two Intel 82433NX Local Bus Extension devices. SIMMs in all banks must be of the same memory size and type. Any (or all) banks may be populated to provide the required system memory.

Note: Symposium OPEN IVR 4.0 requires a minimum of 64 Mbytes of RAM on the R2 AP and MRS/AP. Refer to Chapter 5, "System configuration" for supported memory configurations.

Graphics subsystem

The SVGA subsystem is based on the Cirrus Logic 5430 PCI graphics controller. The Cirrus 5430 supports backward software compatibility with MDA, CGA, Hercules Graphics, EGA, and VGA graphics standards. The standard configuration includes 512 KB of graphics DRAM soldered on the ALTServer baseboard, plus an additional 512Kb of graphics DRAM provided by adding a 256 KB x 16 fast page mode 70 ns DRAM to the SOIC socket on the baseboard. The upgrade to 1Mbyte will allow higher display resolutions and performance. The display RAM is paged into 128 KB of RAM located between A0000H and BFFFFh. Please refer to section 5 for the supported video resolutions.

Monitors

The 21” Viewsonic P815 monitor will be used on the R2 AP and MRS/AP. The dot pitch is 0.26 mm.

The 17” ViewSonic G771 monitor will be used on the R2 AP and MRS/AP. The dot pitch of the monitor is 0.27mm.

The 14” SAMPO KM400 Monitor will be used on the R2 AP and MRS/AP. The dot pitch of the monitor is 0.28mm.

Hard drive

There is currently one hard drive model that is supported on the R2 AP and MRS/AP.

The Seagate ST34573WC (SCA) is the supported hard disk model. This drive has a formatted capacity of 4.55 Gbytes.

The list of supported hard drives may be expanded in the future as more models are introduced in the market and qualified by Nortel.

Tape drive

The supported tape drive is the 2.5 Gbyte Tandberg (SCSI-2) TDC4200.

DAT drive (optional)

The supported DAT drive is Seagate’s 4Gbyte STD28000N.

CD-ROM drive (optional)

The supported CD-ROM drive is the Teac’s 32x SCSI CD-ROM drive.

R2 MRS/Tower

A variety of network and voice processing interfaces and corresponding resource modules such as speech recognition, text-to-speech, and fax options are connected via the PCM Expansion Bus (PEB). PEB is a time-division multiplexed digital bus that allows sharing of resources such as fax, speech recognition, and text-to-speech on the same PEB in the system on a time-sharing basis. Therefore, a dedicated one-to-one relationship of resources to ports is not necessary.

Visual indicators mounted on the MRS display panel (and an external interface connected to the MRS alarm port) provide real-time status information to the system administrator about the MRS power status, trunk activity (up to 48 ports maximum can be displayed), disk activity and system alarms.

Platform hardware components are:

- A tower chassis
- An 18 or 20 slot ISA passive backplane
- 80486 DX2/66 CPU module
- SCSI hard disk controller
- Display controller
- Serial I/O controller
- 32 Mbytes of memory
- UPS port
- Alarm port
- 4 Gbyte SCSI DAT drive (optional)
- 32x SCSI CD-ROM drive (optional)

R2 MRS/Tower hard drive

The hard drives supported on the MRS are the Seagate ST31051N and ST31230N. ST31051N has an unformatted capacity of 1.26 Gbyte and a formatted capacity of 1.06 Gbyte. ST31230N has an unformatted capacity of 1.25 Gbyte and a formatted capacity of 1.02 Gbyte.

The list of supported hard drives may be expanded in the future as more models are introduced in the market and qualified by Nortel.

R2 MRS/Rack

The R2 MRS/Rack can be AC powered or DC powered.

Visual indicators mounted on the MRS/Rack display panel (and an external interface connected to the MRS alarm port) provide status information to the system administrator about the MRS power status at each voltage rail, trunk activity (up to 48 ports maximum), disk activity and system alarms.

A cabinet is also available to house multiple MRS/Rack units.

Platform hardware components are:

- A rack chassis
- An 20 slot ISA passive backplane
- 80486 DX2/66 CPU module
- SCSI hard disk controller
- Display controller
- Serial I/O controller
- 32 Mbytes of memory
- 4 Gbyte SCSI DAT drive (optional)
- 32x SCSI CD-ROM drive (optional)

R2 MRS/Rack hard drive

The hard drive supported on the MRS are the Seagate ST31051N and ST31230N. ST31051N has an unformatted capacity of 1.26 Gbyte and a formatted capacity of 1.06 Gbyte. ST31230N has an unformatted capacity of 1.25 Gbyte and a formatted capacity of 1.02 Gbyte.

The list of supported hard drives may be expanded in the future as more models are introduced in the market and qualified by Nortel.

Symposium OPEN IVR 4.0 platform dimensions

Table 2-1 shows the dimensions of each platform.

Table 2-1: Platform dimensions

Server	Dimensions
Tower AP (700tp) MRS/AP (700tp) MRS/Tower (700tp)	17 inches high, 10.5 inches wide 17.75 inches deep
Tower AP (300tp), MRS/AP (300tp),	17.25 inches high, (18.25 inches with legs), by 8.5 inches wide, by 20 inches deep
Rack AP MRS/Rack	12.5 inches high, 19 inches wide, 19.25 inches deep

Tower AP and MRS/AP (300tp)

The 17” high chassis, manufactured by Tri-Map International, houses fourteen I/O expansion slots, five peripheral bays, and a 400 watt auto-ranging power supply.

Access to the interior passive system baseboard, CPU board, and any add-in cards is provided by three thumbscrews on the rear side. A front panel door opens to access the three external peripheral bays, the 3.5” floppy drive, system reset switch (black), and power-on/off (a grey switch with markings “0” and “1”). Two LEDs display system activity: a red LED indicates SCSI hard disk activity, and a green LED located under the front panel door indicates system power-on. The front panel is protected by a mechanically lockable front door. A key from Tri-Map is available for both the front panel and rear chassis locks.

A shock mount drive cage houses all hard disks and other media devices. It consists of three 3.5” bays and two 5.25” bays. Two internal 3.5” bays provide space for two hard drives. Two external 5.25” half height bays are available for backup or removable media devices. The standard configuration incorporates a 3.5” Teac FD-235 floppy disk drive, which supports both 720KB and 1.44-Mbyte media, and occupies the remaining 3.5” drive bay. In order to install any drives, the whole drive cage must be removed from the chassis first by unscrewing five screws at the side of the drive cage. Three screws can be found at the left side of the cage, while the other two can be found at the right side of the cage.

The 400 watt auto-ranging power supply automatically switches between 110V and 220V AC inputs, supporting use in all parts of the world requiring a switch change. The power supply has five DC peripheral connectors for the drive bays and two mini-output connectors for use with 3.5” floppy drives.

Two papst ball bearing fans are responsible for internal cooling. Each fan transfers air at a rate of $84m^3/h$ (49.4 cfm) from the input filter panel to cool the baseboard and the peripherals. Each fan draws air into chassis for positive pressurization. Each fan is front removable. In order to prevent dust from being driven into the system components, an input front filter, which is made of reticulated polyester foam, is installed. The filtration rate is 20 ppi. The filter is also front removable.

The Tower AP and MRS/AP are comprised of the following standard base components:

- PCI video card with 2 Mbytes DRAM
- Pentium 233MHz (MMX) CPU board
- PS/2-style keyboard and mouse connectors
- 14-slot (8 ISA, 2 ISA/CPU[1], 4PCI) passive backplane
- 512Kbyte Pipeline burst L2 cache
- 64 Mbytes base system memory. Upgradeable to maximum 256 Mbytes
- One parallel port and two 9-pin serial ports
- Adaptec AIC-7870 dual channel PCI SCSI-2 controller card
- 3.5-inch Floppy Drive
- 32x SCSI CD-ROM
- 4.5 Gbyte fast-wide non-hot swappable Hard Drive
- 4 Gbyte SCSI DAT Drive
- 400W auto-switching AC Power Supply
- Choice of 14", 17" or 21" VGA monitor
- mouse

Tower AP and MRS/AP (300tp) CPU board, and passive backplane

Symposium OPEN IVR 4.0 will use Tri-Map's PEAK 530 CPU. In contrast with the Intel ALTServer System used in OPEN IVR 2.x, Tri-Map's baseboard has no built-in SCSI controller or video adapter. PEAK 530 is equipped with Intel Pentium™ 233 MHz processor, high performance PCI Bus, memory support up to 256 Mbytes DRAM, and comply with the new PICMG standard.

1. A ISA-PCI CPU slot consists of an ISA slot **inline** with a PCI slot and can be used by a CPU board that inserts into both slots simultaneously or an ISA board that inserts into the ISA slot.

The Tri-Map CPU board uses Intel 82430HX PCI set to provide high performance PCI I/O. The backplane has eight ISA expansion slots, four PCI slots, and two ISA/CPU slots. One ISA/CPU houses the PEAK 530 board.

Note: Symposium OPEN IVR 4.0 supports only a single CPU board.

Besides serial and parallel ports, the PEAK 530 board also supports Universal Serial Bus (USB) port, which integrates all low/speed I/O's (Keyboard, mouse, SIO,PIO etc.) into one universal external device. Both 5-pin header and 6-pin Mini-DIN (on the right side) keyboard connector are supported on back panel. A second 6-pin Mini-DIN connector, which is the middle one, is used for a PS/2 mouse.

The PICMG standard ensures the compatibility between PCI/ISA backplane.

The Award BIOS provides standard CMOS setup, BIOS features setup, Chipset features setup, power management setup, PCI/ISA IRQ and I/O configurations, and other Peripherals setup.

Tower AP and MRS/AP Pentium processor

The PEAK530 CPU board is shipped with a single Pentium 233 MHz (MMX) processor. Running at an internal speed of 233 MHz, the Pentium processor has an external bus frequency of 66 MHz. This Pentium processor supports both read and write burst mode bus cycles and includes separate 8 kbyte code and 8 kbyte data caches, employing a writeback cache policy. Also integrated into the Pentium processor is an advanced pipelined numeric coprocessor which significantly increases the speed of floating point operations. Based on 3.3V, 0.35 micron technology, the Pentium 233 MHz (MMX) supports SL power management features.

Tower AP and MRS/AP second level (L2) cache

The PEAK 530 CPU board comes with either 256KB or 512KB of high speed pipeline burst SRAM cache. The choice of cache size is a factory option, and is not upgradable in the field.

Note: Symposium OPEN IVR 4.0 only supports 512KB of pipeline burst L2 cache in a Tower AP and MRS/AP.

Tower AP and MRS/AP system memory

Symposium OPEN IVR 4.0 supports the following SIMM specifications and capacity:

- Standard 72-pin Fast Page Mode (FPM) parity DRAM utilizing SIMM technology with 60-70 ns access times
- 32-Mbyte SIMMs
- a minimum of 64 Mbytes and a maximum of 128 Mbytes of memory per platform (AP, MRS, or MRS/AP); new systems are shipped with 64Mbyte RAM (two 32Mbyte SIMMs in bank 0)

  Note: Symposium OPEN IVR 4.0 only supports Fast Page mode RAM. Please refer to Chapter 5, "System configuration for supported memory configurations.

The four SIMM sockets are arranged as two banks, namely Bank 0 and Bank 1, with each bank consisting of two sockets and providing a 64-bit wide data path and 8 parity bits.

Tower AP and MRS/AP SCSI controller

The Adaptec AHA-2940 UltraWide PCI-to-UltraSCSI host adapter provides a powerful multitasking interface between the computer and SCSI devices in one PCI slot. Up to 15 devices can be connected to this Adaptec SCSI adapter. The adapter also has dual channels, which means it has two internal SCSI connectors. One 68-pin 16-bit connector for SCSI wide, and one 50-pin 8-bit connector for SCSI narrow. An external 68-pin SCSI connector is also available. The adapter uses the AIC-7870 SCSI controller chip.

The AIC-7870 SCSI host controller chip incorporates a true 32-bit PCI bus master DMA implementation. It maximizes data transfer on PCI local bus at 133-Mbyte/sec data bursts. Low SCSI command overhead of 50 ms greatly improves command executions. The controller requires only one interrupt per SCSI command, and up to 16 SCSI commands can be stored for auto execution. It supports tagged queuing, scatter/gather. It incorporates 256 bytes Data FIFO buffer which reduces system latencies. It is capable of multithreading, which supports up to eight simultaneous I/O tasks.

Termination on the AHA-2940UltraWide itself is controlled by software commands via the SCSI*Select* utility provided in the SCSI BIOS. The default setting is automatic. When set to automatic, it automatically sets the termination setting for the low and high bytes of the 16-bit Wide SCSI bus. It is recommended that the setting should be left to default setting of Automatic.

Tower AP and MRS/AP graphics subsystem

The SVGA subsystem is based on the STB Nitro64 PCI graphics adapter, which occupies one PCI slot. The main video controller chip is Cirrus Logic GD-5434. Two upgrade sockets are available. If the sockets are occupied, then the adapter has 2 Mbytes of graphics DRAM, which is the standard configuration for Symposium OPEN IVR 4.0. The upgrade will allow higher display resolutions and performance. The STB Nitro64 Video graphics adapter supports standard VGA, Super VGA and VESA modes.

Tower AP and MRS/AP monitors

The 21” (20” viewable) Viewsonic P815 monitor will be used on the AP or MRS/AP. The dot pitch of the monitor is 0.26.

The 17” (16” viewable) Viewsonic G771 monitor will be used on the AP or MRS/AP. The dot pitch of the monitor is 0.27.

The 14” (13” viewable) Sampo KM400 monitor will be used on the AP or MRS/AP. The dot pitch of the monitor is 0.28.

Tower AP and MRS/AP hard drive

Tower AP and MRS/AP uses a Seagate ST34573W (UltraSCSI) hard disk. This Seagate disk has a formatted capacity of 4.55 Gbytes.

The list of supported hard drives may be expanded in the future as more models are introduced in the market and qualified by Nortel.

Tower AP and MRS/AP CD-ROM drive

The Tower AP and MRS/AP use a Teac 32x SCSI CD-ROM drive.

Tower AP and MRS/AP tape drive

The Tower AP and MRS/AP use the Seagate STD28000N 4Gbyte SCSI Digital Audio Tape (DAT) drive.

MRS/Tower (700tp)

The MRS/Tower Industrial Chassis, manufactured by Texas Micro, provides a passive backplane with 16 ISA, 3 PCI and 1 CPU slots. The seven peripheral slide-out/removable drive bays allow integration of CD ROMs, tape drives, hard disks and floppies. The drive bay supports up to four 5.25" media, two 3.5" media and one 3.5" floppy drive.

> ***Note:*** Symposium OPEN IVR 4.0 supports up to 2 hard disks on the MRS/Tower.

Controls behind the front panel door include: disk drive activity, power-on/off LED, system reset and power on/off switch.

Encased in a painted heavy gauge steel chassis 10.5"H x 19"W x 17"D, the MRS/Tower is designed to withstand elevated operational shock, vibration and temperature. Power is supplied by a 350W auto-switching power supply. Cooling is provided by three dual speed 45/90 CFM fans. The fan assembly senses intake air and only runs at higher speed if required, keeping noise to a minimum, while providing balanced cooling of all 20 slots.

Symposium OPEN IVR 4.0 uses the MRS/Tower as a tower platform. Therefore, the tower stand must be installed, and the rack-mount ears should be removed.

Platform hardware components are:

- A tower chassis
- Pentium 233-MHz CPU board
- 20-slot (16 ISA, 1 CPU & 3 PCI) EMI/RFI-resistant passive backplane
- 512kB pipeline burst L2 cache
- 64 Mbytes system memory
- PCI VGA video card with 2 Mbytes of DRAM
- Choice of 14", 17" or 21" VGA monitor
- 3.5-inch Floppy Drive
- Onboard Adaptec SCSI-2 Hard Drive controller
- 4.5 Gbyte SCSI fast-wide non-hot swappable Hard Drive
- 350W auto-switching AC power supply
- 4 Gbyte SCSI DAT drive (optional)
- 32x SCSI CD-ROM drive (optional)

MRS/Tower CPU board

The P5000HX CPU board, manufactured by Texas Micro, provides a 233 MHz (MMX) Pentium processor. It contains on-board PCI Adaptec AIC-7870 SCSI controller chip and a floppy drive controller. It features 512KBytes flash memory and 512KBytes of high-speed pipelined burst SRAM. It supports up to 256 Mbytes scalable FPM DRAM (chip set allows ECC using standard SIMMs).

The P5000HX is fully PICMG compliant.

Two serial ports, one parallel port, one AT-style keyboard header, and one PS/2 mouse header are included in the P5000HX CPU board.

MRS/Tower system memory

The P5000HX supports up to 256 Mbytes of on-board memory. The P5000HX provides four 72-pin SIMM sockets of memory expansion equivalent to two memory banks. Socket 1 and 2 comprise Bank 0. Socket 3 and 4 comprise Bank1. Each bank provides 64-bit data path and 8 parity bits. Memory timing requires 60ns or 70ns fast page devices. Parity generation/checking is provided for each byte.

Symposium OPEN IVR 4.0 supports the following SIMM specifications and capacity:

- Standard 72-pin Fast Page Mode (FPM) parity DRAM utilizing SIMM technology with 60-70 ns access times
- 32Mbyte SIMMs
- a minimum of 64 Mbytes and a maximum of 128 Mbytes of memory per platform (AP, MRS, or MRS/AP); new systems are shipped with 64 Mbytes of RAM (two 32-Mbyte SIMMs in bank 0)

Please refer to of this document for supported memory configuration.

MRS/Tower graphics subsystem

The SVGA subsystem is based on the STB Nitro64 PCI graphics adapter, which occupies one PCI slot. The main video controller chip is Cirrus Logic GD-5434. Two upgrade sockets are available. If the sockets are occupied, then the adapter has two Mbytes of graphics DRAM, which is the standard configuration for Symposium OPEN IVR 4.0. The upgrade will allow higher display resolutions and performance. The STB Nitro64 Video graphics adapter supports standard VGA, Super VGA and VESA modes.

MRS/Tower monitors

The 21” Viewsonic P815 monitor will be used for the MRS. The dot pitch is 0.26 mm.

The 17” ViewSonic G771 monitor will be use for the MRS. The dot pitch of the monitor is 0.27 mm.

The 14” SAMPO KM400 Monitor will be used for the MRS. The dot pitch of the monitor is 0.28 mm.

MRS/Tower hard drive

The hard drive used on the MRS/Tower is the Seagate ST34573W, which has an unformatted capacity of 4.55 Gbytes, and a formatted capacity of 4.55 Gbytes. The MRS/Tower can support up to two hard drives.

The list of supported hard drives may be expanded in the future as more models are introduced in the market and qualified by Nortel.

MRS/Tower tape drive (optional)

See “DAT drive (optional)” on page 2-7.

MRS/Tower CD-ROM drive (optional)

See “CD-ROM drive (optional)” on page 2-7.

Rack AP and MRS/Rack (1000rp)

The Rack AP and MRS/Rack Industrial Chassis, manufactured by Texas Micro provides a passive backplane with 16 ISA, 3 PCI and 1 CPU slot. Front accessible drive bays are available for three peripherals, and one 3.5” floppy drive - providing easy integration of hard drives, tape drives, CD-ROMs, and other devices. In addition, a six hot-swappable SCSI-2 SCA drive rack can be configured for either individual drives or as a type 0, 1 or 5 RAID array, with individual LEDs on the front panel which shows each drive’s activity.

Note: Symposium OPEN IVR 4.0 does not support hardware RAID.

The chassis incorporates on-board server management features that provide operator notification in case of a problem. Power supply, fan, and chassis temperature status are constantly monitored and in the event of failure, audible alarm sound and fault information is displayed on the front panel LEDs.

Each base chassis is equipped with a single 400W industrial grade power supply with the option to add a second redundant supply. These load-sharing/hot-swappable 400W power supplies are designed to handle the power demands for multiple drives and expansion boards. These power supplies can continuously output a full 400 Watt @ +45 ^{O}C and still regulate within 1% tolerance. In addition, the power supplies include advanced features such as active load sharing on all main power outputs, easy hot swap capability, and “power good” monitoring on all outputs.

Chassis cooling is provided by dual redundant, hot swappable fan assemblies. Each fan assembly incorporates two 105 CFM fans operating at half speed. Current pulse detection circuitry monitors fan performance so if a fan failure occurs, the remaining fan increases to full speed to take up the cooling load.

Platform standard components are:

- A rack chassis
- Pentium 233-MHz CPU board
- 20-slot (16 ISA, 1 CPU & 3 PCI) EMI/RFI-resistant passive backplane
- 512kB pipeline burst L2 cache
- 64 Mbytes system memory
- PCI SVGA video card with two Mbytes of DRAM
- VGA monitor (Choice of 14”, 17” or 21”)
- 3.5-inch Floppy Drive
- Onboard Adaptec SCSI-2 Hard Drive controller
- 4.5 Gbyte SCSI SCA hot-swappable hard drive for MRS/Rack
- 6 hot swappable hard drive SCSI RAID Array
- Redundant ready, hot swappable 400W AC or -48V DC power supply
- Redundant ready, hot swappable cooling fans
- System status LED displays for drives, temperature, fans, power
- 4 Gbyte SCSI DAT drive (optional)
- 32x SCSI CD-ROM drive (optional)

The Rack AP and MRS/Rack uses the same CPU board, memory, graphics adapter and monitors as the MRS/Tower.

Rack AP and MRS/Rack hard drive

The hard drive used on the Rack AP and MRS/Rack is the Seagate ST34573WC, which is the hot swappable version of ST34573W with the same unformatted and formatted capacities.

The list of supported hard drives may be expanded in the future as more models are introduced in the market and qualified by Nortel.

Telephony hardware

Dialogic hardware

LSI/80

The LSI/80 Loop Start Interface board connects 8 analog telephone lines PEB based computer telephony resources. Multiple LSI/80 boards can be installed in a single PC chassis, enabling system capacity expansion. The LSI/80 board is an AT form factor board with an 8-bit bus connector installable in either an 8-bit XT or 16 bit AT expansion slot.

D/81A

The D/81A board provides call processing for 8 voice channels in a single ISA slot. Multiple D/81A boards can be installed in a single PC chassis enabling port expansion. The D/81A board is PEB ready. The D/81A board is used in conjunction with the LSI/80 telco interface card.

LSI/120

The LSI/120 Loop Start Interface board connects 12 analog telephone lines to PEB based computer telephony resources. Multiple LSI/120 boards can be installed in a single PC chassis enabling system capacity expansion. The LSI/120 board is an AT form factor board with an 8-bit bus connector installable in either an 8-bit XT or 16-bit AT expansion slot.

D/121B

The D/121B board provides call processing for 12 voice channels in a single ISA slot. Multiple D/121B boards can be installed in a single PC chassis enabling system expansion. The D/121B board is an AT form factor board with a 16-bit bus connector installable in a 16-bit AT expansion slot.

The D/121B board is used in conjunction with the LSI/120 telco interface card.

D/41ESC

The D/41ESC provides four telephone line interface circuits for direct connection to analog loop-start lines, as well as four voice processing channels. Multiple D/41ESC boards can be installed in a single PC chassis enabling system expansion. The D/41ESC card is both PEB and SC bus ready. Symposium OPEN IVR 4.0 will support D/41ESC in A-law encoding only. The D/41ESC board is an AT form factor board with a 16-bit bus connector installable in a 16-bit AT expansion slot.

D/160SC-LS

The D/160SC-LS board connects 16 analog telephone lines to SCbus based computer telephony resources. It incorporates SCSA SCbus, which provides features such as distributed switching, logical addressing, and location-independent resource management. Two independent Motorola DSP56002 DSPs clocked at 40 MHz; each with private, high speed SRAM permit execution of high performance SpringWare[1] signal processing algorithms. Multiple D/160SC-LS boards can be installed in a single PC chassis, enabling system expansion. The D/160SC-LS occupies one ISA slot.

D/240SC-T1

The D/240SC-T1 board is based upon Signal Computing System Architecture (SCSA). SCSA provides features such as distributed switching, logical addressing, and location-independent resource management. DIALOG/HD products provide the flexibility to support both SCbus-based applications or existing PEB-based applications. The board provides 24 digital telco ports and 24 voice processing ports as a T1 interface. It also supports North American PRI (23 Bearer + 1 Data).

D/320SC

The D/320SC board provides call processing for up to 32 voice channels in a single ISA slot and is based upon Signal Computing System Architecture (SCSA). SCSA provides features such as distributed switching, logical addressing, and location-independent resource management. The D/320SC provides the flexibility to support both SCbus-based applications or existing PCM-Expansion Bus (PEB)-based applications. The D/320SC card is used in conjunction with the Aculab E1 telco interface card.

1. SpringWare is a trade-name for Dialogic’s voice processing software.

International Dial Pulse Detection (IDPD) board

Dial Pulse Detection (DPD) capability is supported under Symposium OPEN IVR 4.0 using the DPD algorithm. The DPD functionality is a firmware upgrade to the D/160SC-LS, D/320SC and D/41ESC boards. This architecture provides dedicated DPD support for every voice port on the firmware-upgraded card.

VR/160

Operating in PEB only, the VRP board is an AT form factor board that installs in a 16-bit (ISA) expansion slot. The VR/160 board is comprised of a Voice Recognition Platform (VRP) baseboard and one to four Voice Recognition Module (VRM/40) daughterboards for discrete word recognition or VRM/2C daughterboards for continuous word recognition. Up to four VRM/40 or VRM/2C boards can be fitted on the VRP. Each VRM/40 provides 4 discrete speech recognition ports. Each VRM/2C provides 2 continuous speech recognition ports.

Antares 2000/33

Antares is a stand-alone general purpose Digital Signal Processor (DSP) platform developed for high-density telecommunication applications. It is a DSP expansion board based on the standard Signal Computing System Architecture (SCSA). The Antares 2000/33 board has four independent TI TMS320C31 32-bit floating-point DSPs running at 33MHz, each with high speed SRAM. SCSA enables unified call processing and provides features such as distributed switching, logical addressing, and location independent resource management. These boards provide the flexibility to support both SCSA-based applications or existing PEB-based applications. The Antares board is a general purpose DSP platform that is typically used for speech recognition or text-to-speech applications. It is used by Symposium OPEN IVR 4.0 systems for both speech recognition and TTS. A License Manager security keylock (dongle) may be required to authorize an Antares board for a specific speech technology.

Antares 2000/50

This module is similar to Antares 2000/33, except that it uses four independent TI TMS320C31 32-bit floating-point DSPs running at 50MHz, each with high speed SRAM. It is used by Symposium OPEN IVR 4.0 systems for both speech recognition and TTS. A License Manager security keylock (dongle) may be required to authorize an Antares board for a specific speech technology. The Antares 2000/50 board, like the Antares 2000/33 board, is both PEB and SCBus capable.

GammaLink CP/xx-SC

Operating in SCbus only, the GammaLink fax board offers 4, 6, or 12-port fax capabilities for Symposium OPEN IVR 4.0. Each GammaLink board is a microprocessor-based facsimile modem with its own CPU, custom ASIC, 512Kb of RAM, and 32 Kb PROM. The cards do not require any IRQs, DMA or shared memory. These features allow each fax channel to function as independent fax subsystems interfacing with the main Symposium OPEN IVR 4.0 system. GammaLink fax boards offer:

- 14.4 Kb/s transmission speed
- 96 possible I/O address port selections
- ITU Error Correction Mode (ECM)
- ITU T.434 Binary File Transfer (BFT)
- Multipage TIFF
- V.17, V.27, V.29, V.33 modulation

Aculab hardware

E1 interface board (Rev 4)

The MVIP/PEB Digital (ISDN) Access Card (Rev 4) supports up to 60 speech or data calls over Primary Rate ISDN or private networks. Two different E1 Rev 4 boards are used: 75ohm with 60 lines, and 75 ohm with 30 lines. Connection is also possible to digital PBXs via DPNSS or to E1 type leased lines. The double E1 port card (60 lines) can have a different signalling protocol on each port and can also be utilized in a 'drop and insert' configuration. The incoming lines can be arbitrarily switched to any of the timeslots available on the PCM buses which include the VMIP bus (256 time-slots) and the two PEB buses (2X32 time-slots). The Aculab E1 card supports CAS (Channel Associated Signalling), and enhanced DPNSS protocols. A daughterboard for the Aculab card is required in order to support the CAS protocol.

E1 interface board (Rev 5)

Operating in SCbus only, this module provides an interface to a 2.048Mb/S E1/PRI digital network. Each interface card will support up to 30 or 60 channels. Several types of line terminations are available. These include dual and single port 75 ohm BNC, 120ohm RJ45 line terminations. The on-card switching supports up to 512 full duplex channels (1024 timeslots) on SCbus at 4 MHz. The 30 port card will require one D/320SC card for voice processing; the 60-port card, two such cards.

Brooktrout hardware

TR/114

Operating in PEB only, the TR114 series Fax board (Rev 1 and 2, one Mbyte of memory) offers two, four or eight fax ports in a single ISA slot. Supported models of the TR114 series are TR114-IxT, TR114-IxP and TR114+IxP, where x is the number of fax ports on the fax card. The TR114-IxT and TR114-IxP boards transmit faxes at 9.6 kbps. The TR114+IxP can transmit faxes at speeds up to 14.4 kbps. The TR114 series also support:

- MMR compression
- Error correction mode
- ASCII, TIFF and PCX file conversion and combination on-the-fly for integration with digital network interfaces or resources from other vendors.

Network (LAN) hardware

ZYNX PCI Ethernet

The ZYNX adapters connect the IVR system to an Ethernet network wired with IEEE 802 standard 10BASE2 or 10BASE5 coaxial cable, or **shielded** 10BASE-T twisted-pair cable. The card uses one 32-bit slot (PCI) and 16 bytes of I/O space, starting at any 16-byte boundary from 200h to 3F0h.

3COM PCI Ethernet

The 3COM adapter connects the IVR system to an Ethernet network wired with IEEE 802 standard 10BASE2 or 10BASE5 coaxial cables, or **shielded** 10BASE-T twisted-pair cable. The card uses one 32-bit PCI slot.

SMC ISA Ethernet

The SMC's EtherCard Elite16C Ultra Adapter provides Symposium OPEN IVR 4.0 an Ethernet network connection with IEEE 802 standard 10BASE2 or 10BASE5 coaxial cable, or **shielded** 10BASE-T twisted-pair cable. The card uses an 8-bit or a 16-bit slot (EISA) and 16KB of contiguous available memory space in the region C000 to EFFF.

Madge ISA Smart 16/4 Token Ring

The Smart 16/4 AT Plus Ringnode provides a Token Ring network connection for the Symposium OPEN IVR 4.0 system with the 8-bit or 16-bit Industry Standard Architecture (ISA) bus. The adapter supports both 4 and 16 Mbit/s network and uses STP (Shielded Twisted Pair) connections.

Maximum configuration flexibility is provided by a choice of bus master operation or 16-bit programmed I/O, with numerous IRQ and DMA options.

Host communications hardware

SYNC/570

The SYNC/570 is a high-performance expansion board for ISA computers. The SYNC/570 has two synchronous/asynchronous serial ports. The Hitachi HD64570 Serial Communications Adapter (SCA) provides a highly-integrated communications subsystem for the card. It further maximizes synchronous communications performance by using protocol-specific features to minimize driver overhead. The onboard memory of SYNC/570 is directly addressable by both the system and the SCA's DMA. Program-initiated DMA transfers operate at DMA/memory speed independently of other system activity. The two ports of the SYNC/570 each have a high density DB-15 connector to connect any device with an EIA-232-D interface to the computer. The board operates at line speeds from 4800 baud to 150Kbps.

Madge ISA Smart 16/4 Token Ring

Same as section "Madge ISA Smart 16/4 Token Ring" on page 2-25.

Ethernet TN3270 or TN5250

The ZNYX and the 3COM ethernet boards are used for host connectivity via TN3270 and TN5250.

Digi PC/Xe

The Digi PC/Xe board is a multi channel intelligent serial communications board for ISA computers. The heart of the PC/Xe board is an 80186 microprocessor and 64 kbyte of dual ported RAM, which relieves the computer of the burden of managing the serial ports. The computer can transfer large blocks of data directly to the memory on the board, then move on to other tasks while the board sends the data out the serial port one character at a time. Similarly, the board receives input data and stores it in buffers in its dual ported RAM, so the computer only needs to check periodically to see if data is available.The throughput of the card is maximum 115kb per port.

The dual ported RAM is memory which is accessible for read and write operations by both the board and the computer. To the computer, the dual-ported RAM looks exactly like its own memory, and can be accessed by the same high speed memory referencing commands it uses for its internal memory. This means that a block of data that may take a number of seconds for the PC/Xe board to receive or transmit to the outside world can be transferred between the board and the computer in microseconds.

The dual ported RAM is “mapped” into an unused area in the host computer’s memory address space. The PC/Xe board can be set via software so that the entire 64K is mapped into the computer’s memory, or just an 8K “window”. Using the 8K window allows the user to fit the board into a smaller space when it has to coexist with a number of other expansion boards, many of which also need memory address space.

Digi PC/Xem

To support more than 8 ports, the Digiboard PC/Xem (e.g.PC/16em, PC/32em) family of boards is used. The Digi PC/Xem system consists of a host adapter and up to four Digi PORTS/16em modules. The host adapter plugs into the host computer, and is connected by the Digi External Bus Interface cable to the PORTS module. Each PORTS module is equipped with sixteen EIA-232 asynchronous serial ports, and up to four modules may be daisy-chained together for a total of up to 64 asychronous serial channels.

The ISA host adapter features a 32-bit 20 MHz 3051 RISC processor. 256K dual-ported RAM is used for program code and data buffering.

> ***Note:*** Maximum number of ports supported under Symposium OPEN IVR 4.0 is 32 ports

Peripherals hardware

APC SU-700/700I UPS

The Smart-UPS 700 input/output voltage is rated at 120V, 60Hz. The smart UPS will shutdown the IVR system automatically by sending commands via a serial connection. The SU700i is also supported in countries where the input/output voltage is rated at 220V, 50Hz.

APC SU-1000/1000I UPS

The power rating of the Smart-UPS SU1000 UPS is 1000VA or 870 watts. Its input/output voltage is rated at 120V, 60Hz. The SU1000i is also supported for countries where the input/output voltage is rated at 220V, 50Hz.

APC 2200/2200I RM UPS

Symposium OPEN IVR 4.0 also uses the APC Smart-UPS SU2200RM. The SU2200RM is a rackmount UPS which is used to service simultaneously more than one Rack AP and MRS/Rack in a cabinet.

The SU2200RM is rated at 2200VA, or 1600W with input voltage 120V, 50 or 60 Hz auto switchable. To support 220V, SU2200iRM is used.

Share-UPS

The Share-UPS is a UPS interface expander. One Share-UPS connects up to eight completely OS-independent servers to a single UPS. It can provide notification to each server in case of power failure. It can signal each server to initialize graceful shutdown, and shutdown multiple servers on one UPS. The Share-UPS can also manage reboot when power returns.

The Share-UPS is used in multiple rack configurations.

Modem

A 9600, 14.4K, 28.8K or 33.6Kbps US Robotics external modem is used for remote support.

Cabinet

A cabinet is used to house multiple Rack AP and MRS/Rack units and rackmount UPS. An 8-way system peripheral switch allows one keyboard (with built-in pointing device) and one monitor to be shared across multiple rack units. The cabinet can support both AC or DC powered Rack AP and MRS/Rack platforms. The cabinet can house up to four Rack AP and MRS/Rack units. A 6-outlet power bar is also supplied.

Nortel ADSI phone

The Nortel Vista 350 ADSI phone is used.

Printer support

Printers are as supported by SCO 5.0.4 and are not provided by Nortel.

Symposium OPEN IVR 4.0 hardware configuration matrices

This section lists the hardware components that are supported in the legacy platforms: R2 AP and MRS/AP (700t), R2 MRS/Tower and R2 MRS/Rack, as well as the R4 platforms: AP (300tp), MRS/AP (300tp), MRS Tower (700tp), AP (700tp), MRS/AP (700tp), MRS/Rack and AP/Rack (1000rp).

The table of supported components for a supported platform is divided into a base platform, LAN, host communications (where applicable), peripherals, and telephony (where applicable) components.

Base platform hardware is required for any of the supported configurations. To create a base configuration, the existing OPEN IVR 2.x customer base using legacy hardware may have to upgrade its hardware along with its software when upgrading to Symposium OPEN IVR 4.0.

LAN, host communication and peripheral components may be required or optional.

Telephony components are not supported on the AP (R2 AP and Tower AP and Rack AP). One telco interface is mandatory for any of the supported configurations. Fax, Text-to-Speech and Automatic Speech Recognition are optional.

Hardware supported in the R2 AP

The R2 AP supports the hardware listed in Table 2-2.

Note: Cables are excluded from this table. Refer to Chapter 14, "Components, spares, and MTBF values" for cable information.

Table 2-2: R2 AP components[1]

R2 AP components
Base Platform Hardware
Altair Motherboard/Magellan Tower Chassis, which includes: - CPU: Pentium 75MHz, 100MHz or 133 MHz - 8 slot (5 EISA, 2 PCI and 1 Combo) motherboard - Onboard Adaptec AIC 7870 SCSI controller - 64 Mbytes of RAM - 256 KB Pipeline Cache - 3.5-inch floppy drive - 1 Mbyte of Video DRAM - 525W Power Supply
Choice of one of the following SVGA Monitors: 21-inch 17-inch 14"-inch
SCSI Hard Disk - 4.5 Gbyte (hot swap)
2.5 Gbyte SCSI Tape Drive
32x SCSI CDROM Drive
3 button PS/2 type mouse
101 Enhanced Keyboard
Software security keylock
Digital Audio Tape Drive (optional)

R2 AP components
Network (LAN) Hardware
PCI Combo Ethernet 10Mbps
ISA token ring
Host Communication Hardware
ISA Asynchronous Communications Board (8 ports)
ISA Asynchronous Communications Board (16/32 ports)
16-port expansion module for Digi PC/Xem (Use two such modules for 32 ports)
SDLC Communications Board (SNA over SDLC)
ISA Token Ring Communication Board (SNA over token ring)[a]
PCI Combo 10Mb Ethernet (TN3270/5250)
Peripheral Hardware
SmartUPS (1000VA, 120V)
SmartUPS (1000VA, 220V)
33.6 Kbps external modem

a. Madge's Smart 16/4 AT Plus board is used for LAN connectivity to MRS as well as SNA host communication over token ring. A separate board is required for each connectivity

1. Cables are excluded from the table. See Chapter 13, "Cable connectors and pinouts," and Chapter 14, "Components, spares, and MTBF values" for details.

Hardware supported in the R2 MRS/AP (700t)

The R2 MRS/AP supports the base platform, LAN, and host communication components in Table 2-2, plus the telephony hardware listed in Table 2-3 and the peripheral hardware listed in Table 2-4.

Note: Cables are excluded from Table 2-3. Refer to Chapter 14, "Components, spares, and MTBF values" for cable information.

Table 2-3: Telephony components for R2 MRS/AP[1]

Telephony components for R2 MRS/AP
North American Telephony Hardware
4 Port High Density Card[a]
12-port Loopstart Telco Network Interface Module
12-port Voice Processing Card
T1 High Density Card (Both Rev 1 and Rev 2 are supported)
International Telephony Hardware
8-port Loopstart Telco Network Interface Module
8-port Voice Processing Card
30 Port E1 (75 Ohm) Rev4
60 Port E1 (75 Ohm) Rev 4
CAS daughterboard for 30 port E1
CAS daughterboard for 60 port E1
4 Port High Density Card
32-port Voice Processing Card
Fax, Speech Recognition and Text-To-Speech Hardware
2 Port Fax Card
4 Port Fax Card
8 Port Fax Card

Telephony components for R2 MRS/AP
VCS Voice Recognition platform card
Discrete Voice Recognition Daughterboard (4 port) for VRP
Continuous Voice Recognition Daughterboard (2 port) for VRP
33 MHz General Purpose DSP board
50 MHz General Purpose DSP board
Antares 2000/33 or 2000/50 dongle for VCS Continuous Speech Recognition
Antares 2000/33 or 2000/50 dongle for VCS Discrete Speech Recognition
Antares 2000/33 or 2000/50 dongle for L&H Text-to-Speech
Antares 2000/33 or 2000/50 dongle for TruVoice Text-to-Speech

a. Country variants exist. Dial Pulse Detection firmware is available and supported for a number of country variants of the D/41ESC.

Table 2-4: Peripheral hardware for R2 MRS/AP

Peripheral hardware for R2 MRS/AP
SmartUPS (1000VA, 120V)
SmartUPS (1000VA, 220V)
9600 baud external modem
14.4 Kbps external modem
28.8 Kbps external modem
33.6 Kbps external modem

1. Cables are excluded from the table. See Chapter 13, "Cable connectors and pinouts," and Chapter 14, "Components, spares, and MTBF values" for details.

Hardware supported in R2 MRS/Tower

The R2 MRS/Tower uses the components listed in Table 2-5, plus the telephony hardware listed in Table 2-3.

Note: Cables are excluded from Table 2-5. Refer to Chapter 14, "Components, spares, and MTBF values" for cable information.

Table 2-5: R2 MRS/Tower components[1]

R2 MRS/Tower components
Base Platform Hardware
Tower Chassis with the following components: Chassis assembly include: 18-slot or 20-slot backplane[a], floppy disk drive, Tower trunk status display panel, Major/Minor Alarm LED indicator 486DX2-66MHz CPU board with 32 Mbytes of memory 450W Power Supply[b] Display Panel Controller Serial I/O Controller[c]
1.05 Gbyte SCSI Hard Disk Drive[d] (non hot swappable)
ISA SCSI Controller
Software security keylock
Digital Audio Tape drive (optional)
32x SCSI CDROM drive (optional)
Network (LAN) Hardware
ISA combo ethernet 10Mbps
ISA token ring
Peripheral Hardware
External SCSI Tape Drive 2.5 Gbyte[e]

R2 MRS/Tower components
Smart UPS (700VA, 120V)
Smart UPS (700VA, 220V)
9600 bps external modem
28.8 Kbps external modem
33.6 Kbps external modem

a. The 18-slot MRS/Tower uses the older backplane, which has been replaced by the newer 20 slot backplane, effective December 96.
b. Both power supply models are currently running in the field. However, model I450L L3 has been manufacturer discontinued. Defective power supplies will be replaced by the current model MAX-354-1205G.
c. MRS/Towers running in the field use KW 524E serial I/O controller. This model has been replaced by a new model KW 524J. Defective KW 524E will be replaced by this new model.
d. The current model is Seagate ST31051N.
e. Not packaged with Symposium OPEN IVR 4.0
f. MRS/Tower units running in the field use KW 524E serial I/O controller. This model has been replaced by a new model KW 524J. Defective KW524E serial I/O controllers will be replaced by this new model.

1. Cables are excluded from the table. See Chapter 13, "Cable connectors and pinouts," and Chapter 14, "Components, spares, and MTBF values" for details.

Hardware supported in the R2 MRS/Rack

The R2 MRS/Rack supports the components listed in Table 2-6, plus the telephony hardware listed in Table 2-3 on page 2-32.

Note: Cables are excluded from Table 2-6. Refer to Chapter 14, "Components, spares, and MTBF values" for cable information.

Table 2-6: Base components for the R2 MRS/Rack[1]

Base components for the R2 MRS/Rack
Base platform hardware
Rack chassis with the following components: Chassis Assembly include: Backplane 20-slot Floppy disk drive Rack trunk status display panel Rack power status indicators Built-in alarm port and UPS port Choice of AC or DC power supply 486DX2-66 MHz CPU board with 32 Mbytes of memory Display Panel Controller Serial I/O Controller[a]
1.05 Gbyte SCSI Hard Disk Drive[b] (non hot swappable)
ISA SCSI Controller
Software security keylock
Digital Audio Tape drive (optional)
32x SCSI CDROM drive (optional)
Network (LAN) hardware
ISA Ethernet
ISA Token Ring

Base components for the R2 MRS/Rack
Peripheral Hardware
External SCSI Tape Drive 2.5 Gbyte[c]
Smart UPS (700VA, 120V)
Smart UPS (700VA, 220V)
Rackmount Smart UPS (2200VA, 120V)[d]
Rackmount Smart UPS (2200VA, 220V)[5]
9600 bps Modem
28.8 Kbps external
33.6 Kbps external

a. MRS/Rack units running in the field use KW 524E serial I/O controller. This model has been replaced by a new model KW 524J. Defective KW 524E will be replaced by this new model.
b. The current model is ST31051N.
c. Not packaged with Symposium OPEN IVR 4.0
d. Recommended for multiple (maximum three) MRS units.

1. Cables are excluded from the table. See Chapter 13, "Cable connectors and pinouts," and Chapter 14, "Components, spares, and MTBF values" for details.

Hardware supported in the Tower AP (300tp)

The hardware supported in the Tower AP is listed in Table 2-7.

Note: Cables are excluded from this table. Refer to Chapter 14, "Components, spares, and MTBF values" for cable information.

Table 2-7: Tower AP components

Tower AP components
Base Platform Hardware[a]
Base chassis assembly includes: - Floppy Drive - Chassis assembly - 14 slots (8 ISA/4 PCI/2 CPU) passive backplane. - 400W Power Supply - Cooling Fans
Pentium 233 MHz (MMX) CPU board
64 Mbytes of DRAM (32-Mbyte 60ns SIMM x2)
2-Mbyte PCI SVGA card
PCI SCSI controller with SCSI cable for 4 devices
4.5 Gbyte Ultra-wide SCSI hard disk (non hot swappable)
SCSI 32x CDROM
Digital Audio Tape drive
3-button PS/2 mouse
101-key Keyboard
Choice of one of the following SVGA monitors: - 21 inch - 17 inch - 14 inch
F/F Wide-to-Narrow SCSI Adapter (one for each Narrow SCSI device)
Software security keylock

Tower AP components
Network (LAN) Hardware
PCI 10Mb ethernet[b]
ISA token ring[c]
Host Communication Hardware
ISA Asynchronous Communications Board (8 ports)
ISA Asynchronous Communications Board (16/32 ports)
16-port expansion module for Digi PC/Xem (Use two such modules for 32 ports)
SDLC Communications Board (SNA over SDLC)
ISA Token Ring Communication Board (SNA over token ring)
PCI Combo 10Mb Ethernet (TN3270/5250)
Peripheral Hardware
SmartUPS (700VA, 110V)
SmartUPS (700VA, 220V)
33.6 Kbps External Modem

a. Base spares are excluded from the table.

b. The 3COM Ethernet card can be used for LAN connectivity to the MRS, TN3270/5250 host communications and IPML communications. Customers can elect to order a separate 3COM Ethernet board for IPML communications.

c. Madge's Smart 16/4 AT Plus board is used for LAN connectivity to MRS as well as SNA host communication over token ring. A separate board is required for each connectivity.

Hardware supported in the MRS/AP (300tp)

The MRS/AP supports all the platform, LAN, and host communication hardware listed in Table 2-7 for a Tower AP, plus the telephony hardware listed in Table 2-8, and peripheral hardware listed in Table 2-9.

Note: Cables are excluded from Table 2-8. Refer to Chapter 14, "Components, spares, and MTBF values" for cable information.

Table 2-8: Telephony components for MRS/AP[1]

Telephony components for MRS/AP
North American Telephony Interface
4-port High Density Loopstart Card[a]
16-port High Density Loopstart Card
16-port High Density Loopstart Card with Dial Pulse Detection
High Density T1 Card Rev 2
International Telephony Interface
4-port High Density Loopstart Card
30-port E1 Digital Access Card Rev 5, 75 ohms, BNC
30-port E1 Digital Access Card Rev 5, 120 ohms, RJ45
60-port E1 Digital Access Card Rev 5, 75 ohms, BNC
60-port E1 Digital Access Card Rev 5, 120 ohms, RJ45
CAS daughterboard for 30-port E1
CAS daughterboard for 60-port E1
32-port voice processing card
32-port voice processing card with Dial Pulse Detection
Text-to-Speech & Speech Recognition Hardware
General Purpose 50MHz DSP board
Antares 2000/50 dongle for VCS Continuous Speech Recognition with cut-through

Telephony components for MRS/AP
Antares 2000/50 dongle for VCS Discrete Speech Recognition with cut-through
Antares 2000/50 dongle for L&H Text-to-Speech
Antares 2000/50 dongle for TruVoice Text-to-Speech
Fax Hardware
4 port GammaLink Fax board
6 port GammaLink Fax board
12 port GammaLink Fax board

a. Country variants exist. Dial Pulse Detection firmware is available and supported for a number of country variants of the D/41ESC.

Table 2-9: Peripheral hardware for MRS/AP

Description
SmartUPS (700VA, 110V)
SmartUPS (700VA, 220V)
33.6 Kbps External Modem

1. Cables are excluded from the table. See Chapter 13, "Cable connectors and pinouts," and Chapter 14, "Components, spares, and MTBF values" for details.

Hardware supported in the AP (700tp)

The hardware supported in the AP (700 tp) is listed in Table 2-13, plus the telephony hardware listed in Table 2-8.

Note: Cables are excluded from Table 2-13. Refer to Chapter 14, "Components, spares, and MTBF values" for cable information.

Table 2-10: AP components[1]

AP components
Base Platform Hardware[a]
Base assembly, which includes - Floppy Drive - Chassis with: 20 slot 3PCI/16ISA/1CPU Passive Backplane, Triple Cooling Fan Assembly, - 350W Power Supply - Tower Base
Single Board Computer Pentium 233MHz (MMX) SBC and 512KB cache. - Onboard Adaptec AIC-7870 SCSI controller chip with Wide SCSI-2 onboard connector - Floppy cable, Serial port2, PS2 mouse harness, keyboard adapter 5pin-to-PS/2, Freeze BIOS v4.05.
64 Mbytes of DRAM (32-Mbyte 60ns SIMM x2)
4.5-Gbyte Ultra-SCSI Wide Hard Drive (non hot swappable)
2-Mbyte PCI Video Adapter
Choose one of the following SVGA Monitors: 14-inch 17-inch 21-inch
101 Enhanced Keyboard
F/F Wide-Narrow SCSI Adapter (one for each narrow SCSI device)

AP components
Software security keylock
Digital Audio Tape drive
SCSI 32x CDROM drive (optional)
Network (LAN) Hardware
PCI 10Mb ethernet[b]
ISA token ring[c]
Host Communication Hardware
ISA Asynchronous Communications Board (16/32 ports)
16-port expansion modules for Digi PC/Xem Use two such modules for 32 ports.
SDLC Communications Board (SNA over SDLC)
ISA Token Ring Communication Board (SNA over token ring)
PCI Combo 10-Mbyte Ethernet (TN3270/5250)
Peripheral Hardware
SmartUPS (700VA, 110V)
SmartUPS (700VA, 220V)
33.6 Kbps External Modem

a. Base spares are excluded from the table.
b. The 3COM Ethernet card can be used for LAN connectivity to the MRS, TN3270/5250 host communications and IPML communications. Customers can elect to order a separate 3COM Ethernet board for IPML communications.
c. Madge's Smart 16/4 AT Plus board is used for LAN connectivity to MRS, as well as SNA host communication over token ring. A separate board is required for each connectivity.

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1. Cables are excluded from the table. See Chapter 13, "Cable connectors and pinouts," and Chapter 14, "Components, spares, and MTBF values" for details.

Hardware supported in the MRS/AP (700tp)

The MRS/AP (700tp) supports all the platform, LAN, and host communication hardware for an AP system, as listed in Table 2-13, plus the telephony hardware listed in Table 2-11 and peripheral hardware listed in Table 2-12.

Note: Cables are excluded from the table. Refer to Chapter 14, "Components, spares, and MTBF values" for cable information.

Table 2-11: Telephony components for MRS/AP (700tp)[1]

Description
North American Telephony Interface
4-port High Density Loopstart Card[a]
16-port High Density Loopstart Card
16-port High Density Loopstart Card with Dial Pulse Detection
High Density T1 Card Rev 2
International Telephony Interface
4-port High Density Loopstart Card
30-port E1 Digital Access Card Rev 5, 75 ohms, BNC
30-port E1 Digital Access Card Rev 5, 120 ohms, RJ45
60-port E1 Digital Access Card Rev 5, 75 ohms, BNC
60-port E1 Digital Access Card Rev 5,120 ohms, RJ45
CAS daughterboard for 30-port E1
CAS daughterboard for 60-port E1
32-port voice processing card
32-port voice processing card with Dial Pulse Detection
Text-to-Speech & Speech Recognition Hardware
General Purpose 50MHz DSP board

Description
Antares 2000/50 dongle for VCS Continuous Speech Recognition with cut-through
Antares 2000/50 dongle for VCS Discrete Speech Recognition with cut-through
Antares 2000/50 dongle for L & H Text-to-Speech
Antares 2000/50 dongle for TruVoice Text-to-Speech
Fax Hardware
4 port GammaLink Fax board
6 port GammaLink Fax board
12 port GammaLink Fax board

a. Country variants exists. See Symposium OPEN IVR 4.0 Product Structure [2] for the latest list of supported countries. Dial Pulse Detection firmware is available and supported for a number of country variants of the D/41ESC as per Symposium OPEN IVR 4.0 Product Structure [2].

Table 2-12: Peripheral hardware for MRS/AP

Description
SmartUPS (700VA, 110V)
SmartUPS (700VA, 220V)
33.6 Kbps External Modem

1. Cables are excluded from the table. See Chapter 13, “Cable connectors and pinouts,” and Chapter 14, “Components, spares, and MTBF values” for details.

Hardware supported in the MRS/Tower (700tp)

The hardware supported in the MRS/Tower (700tp) is listed in Table 2-13, plus the telephony hardware listed in Table 2-11.

Note: Cables are excluded from Table 2-13. Refer to Chapter 14, "Components, spares, and MTBF values" for cable information.

Table 2-13: MRS/Tower (700tp) components[1]

MRS/Tower components
Base Platform Hardware[a]
Base assembly, which includes - Floppy Drive - Chassis with: 20 slot 3PCI/16ISA/1CPU Passive Backplane, Triple Cooling Fan Assembly, - 350W Power Supply - Tower Base
Single Board Computer Pentium 233MHz (MMX) SBC and 512KB cache. - Onboard Adaptec AIC-7870 SCSI controller chip with Wide SCSI-2 onboard connector - Floppy cable, Serial port2, PS2 mouse harness, keyboard adapter 5pin-to-PS/2, Freeze BIOS v4.05.
64 Mbytes of DRAM (32 Mbyte 60ns SIMM x2)
4.5-Gbyte Ultra-SCSI Wide Hard Drive (non hot swappable)
2-Mbyte PCI Video Adapter
Choose one of the following SVGA Monitors: 14-inch 17-inch 21-inch
101 Enhanced Keyboard
F/F Wide-Narrow SCSI Adapter (one for each narrow SCSI device)

MRS/Tower components
Software security keylock
Digital Audio Tape drive (optional)
SCSI 32x CDROM drive (optional)
Network (LAN) Hardware
PCI 10Mb ethernet
ISA token ring
Peripheral Hardware
SmartUPS (700VA, 110V)
SmartUPS (700VA, 220V)
33.6 Kbps External Modem

a. Base spares are excluded from the table.

1. Cables are excluded from the table. See Chapter 13, "Cable connectors and pinouts," and Chapter 14, "Components, spares, and MTBF values" for details.

Hardware supported in the MRS/Rack

The hardware supported in an MRS/Rack is listed in Table 2-14, plus the telephony hardware listed in Table 2-11. The MRS/Rack can be either DC powered or AC powered.

Note: Cables are excluded from Table 2-14. Refer to Chapter 14, "Components, spares, and MTBF values" for cable information.

Table 2-14: MRS/Rack components[1]

MRS/Rack components
Base Platform Hardware[a]
AC Platform assembly, which includes: - Floppy drive - Rackmount Chassis with: 3PCI/1 CPU/16 ISA Passive Backplane, Dual hot swappable Fans, three 5.25" Drive and one 3.5" Bays, 6 hot swappable Drive SCSI Array, LED Alarm Display, Rack Slide Kit - 400 W AC power supply
DC Platform assembly, which includes: - Floppy drive FD-235 Teac - Rackmount Chassis with: 3PCI/1 CPU/16 ISA Passive Backplane, Dual hot swappable Fans, three 5.25" Drive and one 3.5" Bays, 6 hot swappable Drive SCSI Array, LED Alarm Display, Rack Slide Kit - DC power supply

MRS/Rack components
Single Board Computer Pentium 233 MHz (MMX) SBC and 512 Kbytes cache: - Onboard Adaptec AIC-7870 SCSI controller chip with Wide SCSI-2 onboard connector - Floppy cable, Serial port2, PS2 mouse harness, keyboard adapter 5pin-to-PS/2, Freeze BIOS v4.05.
64 Mbytes of DRAM (32 Mbyte 60ns SIMM x2)
4.5-Gbyte SCA Ultra-SCSI Wide Hard Drive (hot swappable)
2-Mbyte PCI Video Adapter
Choose one of the following SVGA monitors: 14-inch 17-inch 21-inch
101-key Enhanced Keyboard
F/F Wide-Narrow SCSI Adapter (one for each narrow SCSI device)
Software security keylock
Digital Audio Tape drive (optional)
SCSI 32x CDROM drive (optional)
Network (LAN) Hardware
PCI 10Mb ethernet
ISA token ring
Peripheral Hardware
SmartUPS (700VA, 110V)
SmartUPS (700VA, 220V)
Rackmountable SmartUPS (2200VA, 110V) with UPS cabinet

1. Cables are excluded from the table. See Chapter 13, "Cable connectors and pinouts," and Chapter 14, "Components, spares, and MTBF values" for details.

MRS/Rack components
Rackmountable SmartUPS (2200VA, 220V) with UPS cabinet
Share-UPS (for monitoring multiple servers with one UPS)
33.6 Kbps External Modem
Cabinet - Full Assembly includes: - Cabinet for MRS/Rack (21 inch) - Front or Rear Door Kit for Cabinet - Power Bar - 6 outlets - DC Power Supply for Cabinet (For DC option only) - System Peripheral Switch - 8 Way - 19-inch Rackmount Monitor Enclosure - 101 Enhanced Keyboard - 14” Color Monitor - Rackmount Keyboard Drawer

a. Base spares are excluded from the table.

Hardware supported in the Rack AP (1000rp)

The hardware supported in a Rack AP is listed in Table 2-15. The Rack AP can be DC-powered or AC-powered.

Note: Cables are excluded from Table 2-15. Refer to Chapter 14, "Components, spares, and MTBF values" for cable information.

Table 2-15: Rack AP components[1]

Rack AP components
Base Platform Hardware[a]
AC Platform assembly, which includes: - Floppy drive - Rackmount Chassis with: 3PCI/1 CPU/16 ISA Passive Backplane, Dual hot swappable Fans, three 5.25" Drive and one 3.5" Bays, 6 hot swappable Drive SCSI Array, LED Alarm Display, Rack Slide Kit - 400 W AC power supply
DC Platform assembly, which includes: - Floppy drive FD-235 Teac - Rackmount Chassis with: 3PCI/1 CPU/16 ISA Passive Backplane, Dual hot swappable Fans, three 5.25" Drive and one 3.5" Bays, 6 hot swappable Drive SCSI Array, LED Alarm Display, Rack Slide Kit - DC power supply

Rack AP components
Single Board Computer Pentium 233 MHz (MMX) SBC and 512 Kbytes cache: - Onboard Adaptec AIC-7870 SCSI controller chip with Wide SCSI-2 onboard connector - Floppy cable, Serial port2, PS2 mouse harness, keyboard adapter 5pin-to-PS/2, Freeze BIOS v4.05.
64 Mbytes of DRAM (32 Mbyte 60ns SIMM x2)
SCSI 32x CDROM
4.5-Gbyte SCA Ultra-SCSI Wide Hard Drive (hot swappable)
Digital Audio Tape Drive
2-Mbyte PCI Video Adapter
14-inch Color Monitor
101 Enhanced Keyboard
3-button PS/2 mouse
F/F Wide-Narrow SCSI Adapter (one for each narrow SCSI device)
Software Security keylock
Network (LAN) Hardware
PCI 10Mb Ethernet[b]
ISA token ring[c]
Host Communication Hardware
ISA Asynchronous Communications Board (8 ports)
ISA Asynchronous Communications Board (16/32 ports)
16-port expansion module for Digi PC/Xem (Use two such modules for 32 ports)

1. Cables are excluded from the table. See Chapter 13, “Cable connectors and pinouts,” and Chapter 14, “Components, spares, and MTBF values” for details.

Rack AP components
SDLC Communications Board (SNA over SDLC)
ISA Token Ring Communication Board (SNA over token ring)
PCI Combo 10Mb Ethernet (TN3270/5250)
Peripheral Hardware
SmartUPS (700VA, 110V)
SmartUPS (700VA, 220V)
Rackmountable SmartUPS (2200VA, 110V) with cabinet
Rackmountable SmartUPS (2200VA, 220V) with cabinet
Share-UPS (for monitoring multiple servers with one UPS)
33.6 Kbps External Modem
Cabinet - Full Assembly includes: - Cabinet for MRS/Rack (21 inch) - Front or Rear Door Kit for Cabinet - Power Bar - 6 outlets - DC Power Supply for Cabinet (For DC option only) - System Peripheral Switch - 8 Way - 19-inch Rackmount Monitor Enclosure - 101 Enhanced Keyboard - 14” Color Monitor - Rackmount Keyboard Drawer

a. Base spares are excluded from the table.

b. The 3COM Ethernet card can be used for LAN connectivity to the MRS, TN3270/5250 host communications and IPML communications. Customers can elect to order a separate 3COM Ethernet board for IPML communications.

c. Madge’s Smart 16/4 AT Plus board is used for LAN connectivity to MRS as well as SNA host communication over token ring. A separate board is required for each connectivity.

Board/peripheral/platform support matrices

Table 2-16: Board-platform support matrix for Release 2 platforms

Board x Platform	R2 AP	R2 MRS/AP	R2 MRS/Tower	R2 MRS/Rack
LSI/80	N	Y	Y	Y
LSI/120	N	Y	Y	Y
D/81A	N	Y	Y	Y
D/121B	N	Y	Y	Y
D/41ESC	N	Y	Y	Y
D/240SC-T1	N	Y	Y	Y
D/160SC-LS	N	N	N	N
D/320SC	N	Y	Y	Y
ACL 30 ports, 75Ω, Rev 4	N	Y	Y	Y
ACL 60 ports, 75Ω, Rev 4	N	Y	Y	Y
ACL 30 ports, 75Ω, Rev 5	N	N	N	N
ACL 60 ports, 75Ω, Rev 5	N	N	N	N
ACL 30 ports, 120Ω, Rev 5	N	N	N	N
ACL 60 ports, 120Ω, Rev 5	N	N	N	N
Antares 2000/33	N	Y	Y	Y
Antares 2000/50	N	Y	Y	Y
VR/160	N	Y	Y	Y
Brooktrout fax	N	Y	Y	Y
GammaLink fax	N	N	N	N

Board x Platform	R2 AP	R2 MRS/AP	R2 MRS/Tower	R2 MRS/Rack
SMC Ethernet	N	N	Y	Y
ZYNX Ethernet	Y	Y	N	N
3COM Ethernet	Y	Y	N	N
Madge token ring	Y	Y	Y	Y
Digi PC/Xe	Y	Y	N	N
Digi PC/Xem	Y	Y	N	N
Digi Sync/570	Y	Y	N	N

Table 2-17: Board-platform support matrix for Release 4 platforms

Board x Platform	Tower AP	MRS/ AP	AP (700tp)	MRS/AP (700tp)	MRS/ Tower (700tp)	MRS/ Rack	Rack AP
LSI/80	N	N	N	N	N	N	N
LSI/120	N	N	N	N	N	N	N
D/81A	N	N	N	N	N	N	N
D/121B	N	N	N	N	N	N	N
D/41ESC	N	Y	N	Y	Y	Y	N
D/240SC-T1	N	Y	N	Y	Y	Y	N
D/160SC-LS	N	Y	N	Y	Y	Y	N
D/320SC	N	Y	N	Y	Y	Y	N
ACL 30 ports, 75Ω, Rev 4	N	N	N	N	N	N	N
ACL 60 ports, 75Ω, Rev 4	N	N	N	N	N	N	N

Board x Platform	Tower AP	MRS/ AP	AP (700tp)	MRS/AP (700tp)	MRS/ Tower (700tp)	MRS/ Rack	Rack AP
ACL 30 ports, 75Ω, Rev 5	N	Y	N	Y	Y	Y	N
ACL 60 ports, 75Ω, Rev 5	N	Y	N	Y	Y	Y	N
ACL 30 ports, 120Ω, Rev 5	N	Y	N	Y	Y	Y	N
ACL 60 ports, 120Ω, Rev 5	N	Y	N	Y	Y	Y	N
Antares 2000/33	N	N	N	N	N	N	N
Antares 2000/50	N	Y	N	Y	Y	Y	N
VR/160	N	N	N	N	N	N	N
Brooktrout fax	N	N	N	N	N	N	N
GammaLink fax	N	Y	N	Y	Y	Y	N
SMC Ethernet	N	N	N	N	N	N	N
ZYNX Ethernet	N	N	N	N	N	N	N
3COM Ethernet	Y	Y	Y	Y	Y	Y	Y
Madge token ring	Y	Y	Y	Y	Y	Y	Y
Digi PC/Xe	N	N	N	N	N	N	N
Digi PC/Xem	Y	Y	Y	Y	N	N	Y
Digi Sync/570	Y	Y	Y	Y	N	N	Y

Table 2-18: Peripheral-platform support matrix for Release 2 platforms

Board x Platform	R2 AP	R2 MRS/AP	R2 MRS/Tower	R2 MRS/Rack
APC SU700	N	N	Y	Y
APC SU1000	Y	Y	N	N
APC SU2200RM	N	N	N	Y
9.6kbps external modem	N	Y	Y	Y
14.4 kbps external modem	N	Y	N	N
28.8 kbps external modem	N	N	Y	Y
33.6 kbps external modem	Y	Y	Y	Y

Table 2-19: Peripheral-platform support matrix for Release 4 platforms

Board x Platform	Tower AP	MRS/AP	AP (700tp)	MRS/AP (700tp)	MRS/ Tower	MRS/ Rack	Rack AP
APC SU700	Y	Y	Y	Y	Y	Y	Y
APC SU1000	N	N	N	N	N	N	N
APC SU2200RM	N	N	N	N	N	Y	Y
Microlog AIU[a]	N	Y	N	N	Y	Y	N
9.6kbps external modem	N	N	N	N	N	N	N
14.4 kbps external modem	N	N	N	N	N	N	N
28.8 kbps external modem	N	N	Y	Y	N	N	N
33.6 kbps external modem	Y	Y			Y	Y	Y

a. Analog telco interface only.

Table 2-20: Platform usage matrix

	R2 AP and MRS/AP	R2 MRS/Tower	R2 MRS/Rack	Tower AP and MRS/AP	MRS/Tower AP and MRS/AP	Rack AP and MRS/Rack
AP	Y	N	N	Y	Y	Y
MRS/AP	Y	N	N	Y	Y	N
MRS	N	Y	Y	N	Y	Y

Chapter 3: System software description

AP software

The AP software is comprised of base software, options and third party software. Base AP software is software that is loaded on the hard drive of any ordered AP configuration. Note that some of the base AP software features are controlled by the license manager and must be enabled in the AP's license file before they can be used.

Base AP software

The base AP software includes the following components:

- The following base AP software components:
  - AP software executables and cells needed to develop applications
  - Libraries that provide resources for User Function processes
  - Help text files for application cells
  - Software tools for AP software setup and maintenance
  - License Manager software
  - Cell Builder
  - Prompt Manager
  - SNMP support
  - AP software executables for host communications
  - AP software executables for RDBMS communications
  - WEB interface
  - Prompt Import Utility

- Report Writer software

- NTTEST application and prompt

Software version and disk space requirements for base AP software

The AP software and NTTEST is installed in the **/u** (**/dev/u**) UNIX partition. The disk space requirements are listed in the Table 3-1.

Table 3-1: Software version and disk space requirements for base AP software

Software Packages	Version	Size (Mbytes)
Base AP software	4.0	66.7
NTTEST	4.0	2.9

AP software options

There is no separately installable AP software space optional software; however, some base AP software features are controlled by the license manager as follows:

- Cell Builder
- Prompt Manager
- Host communications
- SNMP Support
- RDBMS communications
- Web interface
- Integration Package for Meridian Link (IPML)
- Disk Mirroring

Third-party software on the AP

Third party software supported on the AP is listed in the following sections. These software options, except for the RDBMS server, are installed under / (**/dev/root**).

RDBMS client software should be installed in a directory under the **/dev/u**/ partition. If the RDBMS server must be installed locally, it should also be installed in a directory under the **/dev/u**/ partition. However, it is recommended that the RDBMS server be installed remotely.

An RDBMS server should never be installed locally into the root directory as doing so could result in filling up the root filespace and crashing the system.

UPS, Disk Mirroring, and IPML software

UPS, Disk Mirroring, and Integrated Package for Meridian Link (IPML) software and versions are listed in Table 3-2. These options are installed under / (**/dev/root**).

Table 3-2: UPS, Disk Mirroring, and IPML software versions and disk space requirements

Software	Version	Size (Mbytes)
UPS PowerChute *plus* power monitoring and shutdown software[a]	4.2.2	4.0
Disk mirroring	2.03	2.0
Integration Package for Meridian Link (IPML)	2.03	9.4

a. On the R2 platforms, proprietary UPS software is used for UPS communications.

RDBMS software

In addition to the local informational database, Symposium OPEN IVR 4.0 can connect with several RDBMS platforms that support ANSI SQL. The server component of the database can reside either locally, or remotely. If the server is installed locally, it should be installed in a directory under the **/dev/u**/ partition. Do not install the server in the root partition.

A database client, such as SQL*NET from Oracle software, must be installed locally on the AP or MRS/AP in a directory under the **/dev/u**/ partition. Informix, Ingres, Oracle, and Sybase provide native drivers for SCO OpenServer R4.2 V5.0.2.

Table 3-3: Supported RDBMS server and client versions

Vendor	Server Version	Client Software
Informix	Standard Edition 7.1	Informix Connect 7.2
Ingres	Ingres 6.4/06	Open Ingres 1.2/01
Oracle	7.3	SQL*Net Version 2
Sybase	Open System 10.0.411.0.3	Open Client 10.0.3

Note 1: For RDBMS disk space, see the database vendor's documentation for information on client and server disk space requirements.

Note 2: Ingres 6.4/06 is not supported with the 6.4/04 or 6.4/05 drivers.

Host connectivity supported versions

Host connectivity requires the Apertus Express software package to be installed on the AP. The software is installed under / (**/dev/root**). The following options are available:

Table 3-4: Supported host connectivity software versions and disk space requirements

Transport protocol	Software version	Size (Mbytes)
TCP/IP	Express TN3270/5250, Release 1.31 SCN 5152	3.0
SNA	Express Release 2.1, SCN 4153	50.0

Communication using a serial link (RS232) does not require the Express software package to be installed on the AP.

MRS software

The MRS software is comprised of base MRS software, MRS software options and supported third party software. Base MRS software is software that is loaded on the hard drive of any ordered MRS configuration. Note that some of the base MRS software features are controlled by the license manager and must be enabled in the MRS's license file before they can be used.

Base MRS software

The base MRS software is installed in the **/** (**/dev/root**) UNIX partition. The software versions and disk space requirements are listed in Table 3-5.

Table 3-5: Base MRS software components versions and disk space requirements

Software Packages	Version	Size (Mbytes)
Base Package (PEB) Base Package (SCBus)	4.00.04.09 4.00.04.09	17.7
Dialogic System Release Firmware /usr/dialogic/data/d12x.fwl Firmware /usr/dialogic/data/d4x.fwl Firmware /usr/dialogic/data/d8x.fwl Firmware /usr/dialogic/data/genboot.fwl Firmware /usr/dialogic/data/msi.fwl Firmware /usr/dialogic/data/sbdiag.fwl Firmware /usr/dialogic/data/vr121.fwl Firmware /usr/dialogic/data/vr160.fwl Firmware /usr/dialogic/data/vr40.fwl Firmware /usr/dialogic/data/vrxxx.fwl	4.2 5.62 exp 0.00 5.62 alpha 0.00 5.62 alpha 0.00 5.62 exp 0.00 1.61 exp 0.00 1.00 exp 0.00 1.12 exp 0.00 2.13 exp 4.00 3.00 exp 6.37 1.12 exp 0.00	9.0
Dialogic SPAN Firmware Update Firmware /usr/dialogic/data/span.fwl	5.89 5.89 exp 5.00	0.1
Dialogic Country Specific Parameters	4.00.04.07	0.1

Software Packages	Version	Size (Mbytes)
System Configuration	4.00.04.09	1.8
System Prompts	1.07	1.5
Progress Tones	1.02.00	1.2
Test Prompts	1.02.00	0.3
System Panel Drivers (Installed for R2 MRS/Rack or MRS/Tower systems only.)	4.00.00	0.1

MRS software options

Software additional to the base MRS software must be installed on the hard drive of the MRS for the following MRS software options. MRS software options are controlled by the MRS license Manager.

Table 3-6: MRS software options versions and disk space requirements

Software Packages	Version	Size (Mbytes)
Fax option		
GammaLink Fax option (SCbus)	4.00.03.00	2.7
Brooktrout Fax option (PEB)	4.00.04.00	2.3
Aculab E1 option		
E1 CAS Signaling option	4.00.04.00	1.6
ETS 300 (Euro ISDN) Signaling option	4.00.04.00	1.5
Basic DPNSS Signaling option	4.00.04.00	0.6
Enhanced DPNSS Signaling option	4.00.04.00	1.9
QSIG Signaling option	4.00.04.00	0.8
VR/160 VCS ASR option (PEB)	4.00.04.06	1.8
Dialogic Antares SDK for SCO[a]	2.3bl	1.7
VCS/Antares ASR option		
VCS/Antares ASR option	4.00.04.06	1.0
VCS/Antares ASR Base Package SDK		1.8
Purespeech/Antares		
Purespeech/Antares ASR option	4.00.04.08	1.1
Purespeech/Antares ASR SDK	2.00	35.0
TruVoice		
Truvoice SDK for UNIX	4.00.00	1.7
TruVoice TTS option		1.3
L&H/Antares	4.00.00	
L & H/Antares SDK for SCO UNIX 3.2		1.4
L & H/Antares TTS option		0.8
Dialogic Global DPD option for UNIX Firmware /usr/dialogic/data/dpd120.fwl	1.01 exp 0.01	1.7

a. A single installation of the Dialogic Antares SDK for SCO is required per system for all Antares-based speech technologies.

Languages and vocabs version

Software	Version	Size (Mbytes)
VR/160 VCS Vocabs - Discrete English: US English	4.00.04	0.2
VR/160 VCS Vocabs - Continuous English: US English	4.00.04	0.3
VCS/Antares ASR Vocabs - Discrete w/ Cut Through English: U.S. English Canadian English Portuguese: Brazilian Portuguese Spanish: Castilian Spanish	4.00.03	0.3
VCS/Antares ASR Vocabs - Continuous English: U.S. English U.K. English Canadian English German Spanish: Castilian Spanish	4.00.03	0.5
Purespeech/Antares ASR Vocabs - Continuous - U.S. English Rules & Description Files - Latin American Spanish Rules & Description Files	4.00.03	0.4

Software	Version	Size (Mbytes)
L&H/Antares TTS Languages		
Dutch COFF Files	7.00	1.7
Dutch Rules & Description Files	4.00.00	0.1
U.S. English COFF Files	700	2.1
U.S. English Rules & Description Files	4.00.00	0.1
French COFF Files	7.00	1.8
French Rules & Description Files	4.00.00	0.1
German COFF Files	7.00	1.6
German Rules & Description Files	4.00.03	0.1
Italian COFF Files	7.00	1.5
Italian Rules & Description Files	4.00.00	0.1
Spanish		
- Castilian Spanish COFF files	7.00	1.8
- Castilian Spanish Rules & Description Files	40.00.00	0.1
TruVoice TTS Languages		
U.S. English	4.00.00	0.4

Third-party software on the MRS

Other third party software supported on the MRS are the UPS and Disk Mirroring packages listed in Table 3-7. This software is installed under / (**/dev/root**).

Table 3-7: UPS and Disk Mirroring software versions and disk space requirements

Software	Version	Size (Mbytes)
UPS PowerChute *plus* power monitoring and shutdown software[a]	4.2.2	4.0
Disk mirroring	2.03	2.0

a. On the R2 MRS/Tower and R2 MRS/Rack, proprietary UPS software is used for UPS communications.

MRS/AP software

The MRS/AP software is the combination of MRS and AP software components.

The MRS/AP disk space requirements are the sum of the MRS and AP requirements.

Operating system

The operating system is SCO OPENServer 3.2v5.0.4c Enterprise Operating System provided by the Santa Cruz Operation. This section provides a highlight of the features of the SCO operating system. Further information is provided in the operating system manuals.

Runtime system

Table 3-8 shows the software versions and disk space requirements. Description of the operating system follows Table 3-8.

Table 3-8: Runtime operating system software versions and disk space requirements)

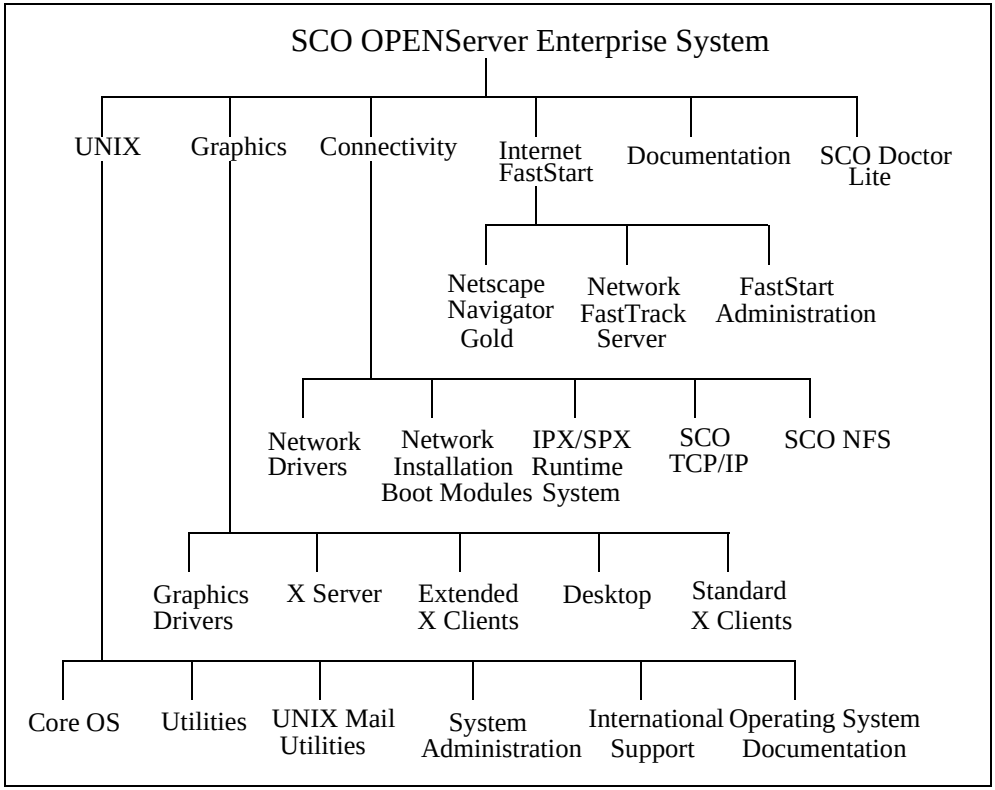
Service Component	Version	Size (Mbytes)
SCO OPENServer Enterprise System UNIX		
SCO OPENServer Enterprise System Core OS	5.0.4c	52.0
SCO OPENServer Enterprise System Utilities	5.0.4c	13.0
SCO OPENServer Enterprise System UNIX Mail Utilities	5.0.4c	3.0
System Administration	5.0.4c	6.5
International Support	5.0.4c	2.5
Documentation		1.0
SCO OPENServer Enterprise System Graphics		
X Server and Graphics Drivers	5.0.4p	25.5
Extended X Clients	5.1.2b	20.0
Desktop	3.6.2b	8.0
Standard X Clients	5.1.2b	5.5
SCO OPENServer Enterprise System Connectivity		
SCO OPENServer Enterprise System Network Drivers	5.0.4p	4.5
Network Installation Boot Modules	5.1.0b	20.5
IPX/SPX Runtime System	2.1.0Ab	1.0
SCO TCP/IP	2.1.0Eb	10.5
SCO NFS	2.1.0Eb	2.0
SCO OPENServer Enterprise System Internet FastStart		
SCO Netscape Navigator Gold	3.0.1c	14.5
SCO Netscape FastTrack Server	2.0.1d	32.0
FastStart Administration	1.2	
SCO OPENServer Enterprise System Documentation	5.0.4p	35.0
SCO Doctor Lite	2.0.0b	5.0
TOTAL disk space requirement		**262.0**

The SCO OPENServer Enterprise Runtime System is comprised of the following components:

- SCO OPENServer Enterprise System UNIX - Contains the core operating system, utilities, and administrative tools.
- SCO OPENServer Enterprise System Graphics - Contains X Windows system, Desktop manager and graphics drivers.
- SCO OPENServer Enterprise System Connectivity - Contains support for network protocols including:
  - TCP/IP, which includes telnet, rlogin, and ftp utilities and support for SLIP and PPP.
  - IPX/SPX
  - SMTP
  - HTTP
  - SNMP
  - NetBEUI
  - NetBIOS
  - POP3
- SCO OPENServer Enterprise System Internet FastStart - Includes Netscape Navigator Gold and Netscape FastTrack Server.
- SCO OPENServer Enterprise System Documentation - Utilizes the scohelp client to present context sensitive help.
- SCO Doctor Lite - Provides live system monitoring which can identify low system resources. This tool provides a visual method for identifying system problems such as low disk space, low memory, and low swap space.

Figure 3-1 on page 3-13 shows the relationship between the SCO OPENServer Enterprise System services.

Figure 3-1: SCO OPENServer Enterprise System services



Development system

SCO OPENServer Development System 5.1.0Ac is a supplementary service layered over the core operating system.

Table 3-9 on page 3-14 shows the software versions and disk space requirements. Description of the operating system follows Table 3-9.

Table 3-9: Development operating system software versions and disk space requirements

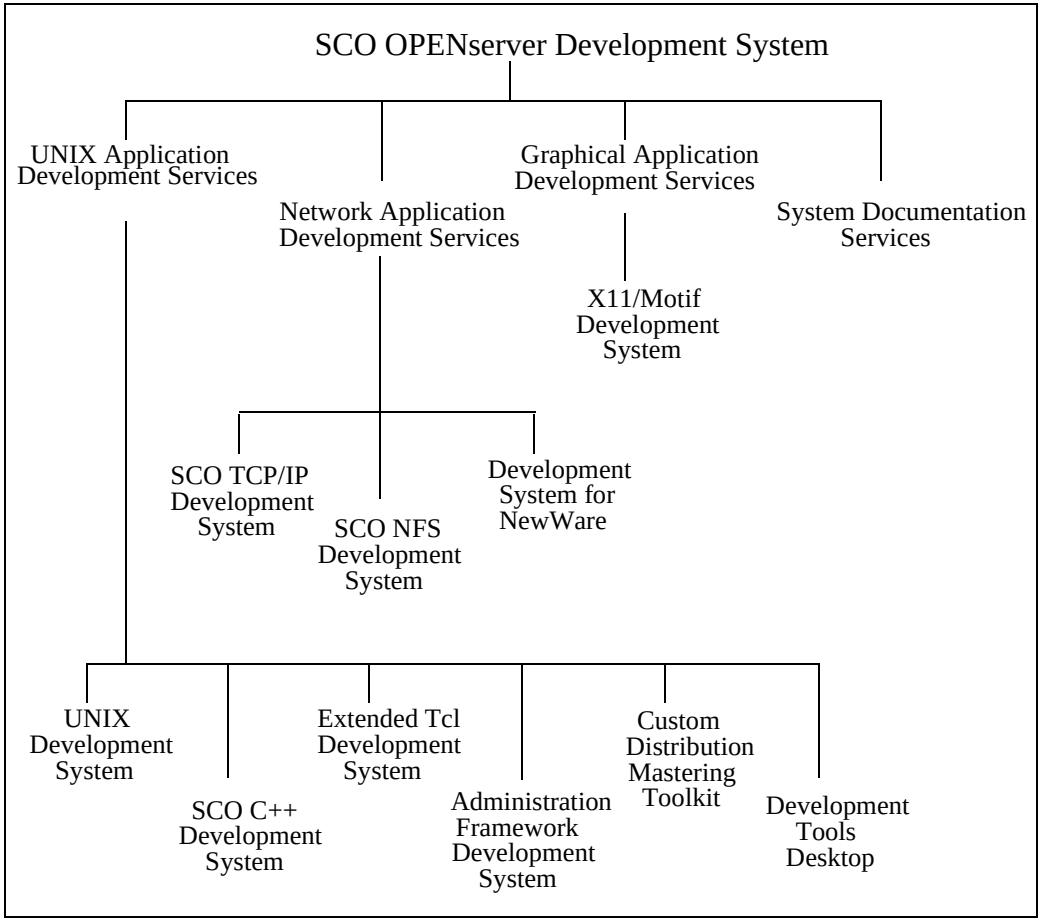
Service Component	Version	Size (Mbytes)
UNIX Application Development Services		
UNIX Development System component	5.1.0Ha	18.9
SCO C++ Development System component	3.1.3Fb	1.9
Extended Tcl Development System component	7.3.2b	2.3
Administration Framework Development System component	1.0.1Aa	2.8
Custom Distribution Mastering Toolkit component	1.2.0i	1.2
Development Tools Desktop component	1.0.0a	0.6
Network Application Development Services		
SCO TCP/IP Development System component	2.1.0Eb	1.7
SCO NFS Development System component	2.1.0Eb	0.4
Development System for NetWare component	2.0.0c	0.1
Graphical Application Development Services		
X11/Motif Development System component	5.2.5i	9.6
Development System Documentation Services		16.5
TOTAL disk space requirement		56.0

Below is a description of the Development System services:

- UNIX Application Development Services - Includes the compilers, debuggers, programming tools, and libraries for developing UNIX applications. It also provides Development Systems for C++, Extended Tcl, and Administrative Framework.
- Network Application Development Services - Includes the libraries and header files (sockets, XTI, and TLI) used to access the available transport stacks (TCP/IP, IPX/SPX, and NetBIOS).
- Graphical Application Development Services - Provides the X Windows System and OSF/Motif development tools.
- System Documentation Services - Utilizes the scohelp client to present context sensitive help.

Figure 3-2 shows the relationship between the SCO Development System services.

Figure 3-2: SCO Development System services



Additional information on the above services can be obtained from the SCO OPENserver Development System Release and Installation Notes [1].

Drivers, diagnostics, and system dependent software

The following software will be installed on all platforms:

- LAN drivers
  - ZNYX ZX312 PCI Etheraction Driver
  - 3COM Etherlink XL PCI
  - SMC 8216 Ethercard Ultra
  - Madge Smart TR-Adapter Driver
- Diagnostics
  - ZNYX DIAG312 - Provides setup info on the ZNYX PCI ethernet card.
  - 3COM Configuration and Diagnostic Program - Provides setup info on the 3COM PCI ethernet card.
  - Madge Wizard - Configuration utility for the Madge ISA ethernet card.
  - SMC Diagnostics - Utility to configure the SMC ISA ethernet card.
  - SYNC/570 Protected Mode Diagnostic - Utility for the SYNC/570 card.
  - Brooktrout Diagnostics - Utilities for the Brooktrout Fax card.
  - Intel PC Diag - Various utilities for system testing.
  - Digi Diagnostics - Utility to test Digiboard configurations.
  - Dialogic Diagnostics - a UNIX-based diagnostic for Dialogic cards.
- BIOS
  - SCU - System Configuration Utility for the R2 AP and MRS/AP.

  Note: All other platforms do not require a DOS utility for configuration.
- SCSI BIOS
  - 7870CFG - 7870 SCSI controller setup utility for R2 AP and MRS/AP.

  Note: No other platforms require a DOS utility for SCSI BIOS configuration.

Table 3-10: LAN driver versions

Hardware Platform	Adapter Driver Name	Version	Size (Mbytes)
R2 AP	ZNYX ZX312 PCI Etheraction Driver 3COM Etherlink XL PCI	2.26 2.0.0d	1.0 1.0
R2 MRS/AP	ZNYX ZX312 PCI Etheraction Driver 3COM Etherlink XL PCI	2.26 2.0.0d	1.0
R2 MRS/Tower	SMC 8216 Ethercard Ultra	5.0.4d	1.0
R2 MRS/Rack	SMC 8216 Ethercard Ultra	5.0.4d	1.0
Tower AP	3COM Etherlink XL PCI	2.0.0d	1.0
MRS/AP	3COM Etherlink XL PCI	2.0.0d	1.0
Rack AP	3COM Etherlink XL PCI	2.0.0d	1.0
MRS/Rack	3COM Etherlink XL PCI	2.0.0d	1.0
ALL	Madge Smart TR-Adapter Driver	1.00.03	1.0

Table 3-11: Diagnostics versions

Diagnostic Name	Version	Size (Mbytes)
ZNYX DIAG312	1.24	0.1
3COM Configuration and Diagnostic Program	2.1	0.3
Madge Wizard	1.6 LSS (5.0)	1.3
SMCDiagnostics	4.01	0.3
Intel PC Diag	3.42	5.6
Sync/570 Protected Mode Diagnostic	4.00.03	0.4
Brooktrout Diagnostic	3	1.2
Digi Diagnostics	1.8.0	0.1
Universal Dialogic Diagnostics (UDD)	1.35	2.5

Table 3-12: System BIOS versions

Hardware Platform	BIOS Name	Version
R2 AP	American Megatrends Inc.	1.00.17.BI0
R2 MRS/AP	American Megatrends Inc.	1.00.17.BI0
R2 MRS/Tower	American Megatrends Inc.	40-0201-536250-00001111-1111 92-OPWB4SXB-H
R2 MRS/Rack	American Megatrends Inc.	40-0201-536250-00001111-1111 92-OPWB4SXB-H
Tower AP	Award Modular	4.51PG 12/02/97-i430HX-2A59FU81C-00
MRS/AP	Award Modular	4.51PG 11/17/97-i430HX-2A59FU81C-00
MRS/Tower (700tp)	Industrial Computer	4.05a.1.2d
Rack AP	Industrial Computer	4.05a.1.2d
MRS/Rack	Industrial Computer	4.05a.1.2d

Note: For the R2 AP and MRS/AP, configuration is done via the SCU utility under DOS. See Table 3-14 on page 3-20.

Table 3-13: SCSI BIOS versions

Hardware Platform	SCSI Controller	Version
R2 AP	Adaptec AIC-7870	1.19S6
R2 MRS/AP	Adaptec AIC-7870	1.19S6
R2 MRS/Tower	Adaptec AHA-1542CF/1542CP	2.02/1.02
R2 MRS/Rack	AdaptecP AHA-1542CF/1542C	2.02/1.02
Tower AP	Adaptec AHA-2940UW	1.25
MRS/AP	Adaptec AHA-2940UW	1.25
MRS/Tower (700tp)	Adaptec AIC-7870	1.2
Rack AP	Adaptec AIC-7870	1.2
MRS/Rack	Adaptec AIC-7870	1.2

Note: For the R2 AP and MRS/AP, configuration is done via the 7870CFG utility under DOS. See Table 3-14.

Table 3-14: R2 AP and MRS/AP utility versions

Software	Version	Size (Mbytes)
SCU	3.31	0.5
7870CFG	1.19S6	0.1

Software availability matrix

The following matrix lists the software packages available for each hardware platform.

Table 3-15: Software availability matrix for R2 hardware platforms

Software Package	R2 AP	R2 MRS/AP	MRS/Rack	MRS/Tower
SCO Runtime	STD	STD	STD	STD
SCO Development	OPT	OPT	NA	NA
Base AP software	STD	STD	NA	NA
ADSI	OPT	OPT	NA	NA
SNMP	OPT	OPT	NA	NA
Host Comm. (any type)	OPT	OPT	NA	NA
RDBMS Comm.	OPT	OPT	NA	NA
WEB interface	OPT	OPT	NA	NA
IPML	OPT	OPT	NA	NA
Base MRS software	NA	STD	STD	STD
GammaLink Fax	NA	NA	NA	NA
Brooktrout Fax	NA	OPT	OPT	OPT
Aculab E1	NA	OPT	OPT	OPT
VR/160 VCS ASR	NA	OPT	OPT	OPT
VCS/Antares	NA	OPT	OPT	OPT
Purespeech/Antares	NA	NA	NA	NA
TruVoice/Antares	NA	OPT	OPT	OPT
L&H/Antares	NA	OPT	OPT	OPT
Dialogic DPD	NA	NA	NA	NA
Digital Switching	NA	NA[a]	NA[1]	NA[1]

Software Package	R2 AP	R2 MRS/AP	MRS/Rack	MRS/Tower
LAN Drivers	STD	STD	STD	STD
Diagnostics	STD	STD	STD	STD
BIOS	STD	STD	STD	STD
SCSI BIOS	STD	STD	STD	STD

a. Digital switching is supported and standard on the Aculab card in PEB systems.

Table 3-16: Software availability matrix for R4 hardware platforms

Software Package	Tower AP	MRS/AP	MRS/Tower	Rack AP	MRS/Rack
SCO Runtime	STD	STD	STD	STD	STD
SCO Development	OPT	OPT	NA	OPT	NA
Base AP software	STD	STD	NA	STD	NA
ADSI	OPT	OPT	NA	OPT	NA
SNMP	OPT	OPT	NA	OPT	NA
Host Comm. (any type)	OPT	OPT	NA	OPT	NA
RDBMS Comm.	OPT	OPT	NA	OPT	NA
WEB interface	OPT	OPT	NA	OPT	NA
IPML	OPT	OPT	NA	OPT	NA
Base MRS software	NA	STD	STD	NA	STD
GammaLink Fax	NA	OPT	OPT	NA	OPT
Brooktrout Fax	NA	NA	NA	NA	NA
Aculab E1	NA	OPT	OPT	NA	OPT
VR/160 VCS ASR	NA	NA	NA	NA	NA

Software Package	Tower AP	MRS/AP	MRS/Tower	Rack AP	MRS/Rack
VCS/Antares	NA	OPT	OPT	NA	OPT
Purespeech/Antares	NA	OPT	OPT	NA	OPT
TruVoice/Antares	NA	OPT	OPT	NA	OPT
L&H/Antares	NA	OPT	OPT	NA	OPT
Dialogic DPD	NA	OPT	OPT	NA	OPT
Digital Switching	NA	OPT	OPT	NA	OPT
LAN Drivers	STD	STD	STD	STD	STD
Diagnostics	STD	STD	STD	STD	STD
BIOS	STD	STD	STD	STD	STD
SCSI BIOS	STD	STD	STD	STD	STD

Processes

Processes on the AP

AP software processes

Below is a description of the AP software processes and subsystems:

Call Logic Subsystem (CLS). Contains processes and libraries that control applications.

- CLI - Call Logic Interpreter. Executes and manages applications.
- CLI_S - CLI Statistics Collector Process. This process receives statistics data from the CLI at the end of every call. The CLI_S writes this information to the file audit_stat.d. Reports can be viewed from the data in this file using the Report Writer product.
- CDL - Cell Definition Language. Compiler which translates the cell definition language into binary code which can be interpreted by the CLI.
- DBS - Database Server. Proprietary database process. This process controls message and information databases in applications.

- CDF - Cell Scripting Language compiler. Compiler which translates descriptions of how cells will look in the graphical editor (.cdf files) into binary files called .cdo files. This compiler also creates the cell modifier list (in the .mod file) for the description being translated. At runtime, the graphical editor reads the .cdo file to determine how to display a particular cell. The cdl compiler reads the .mod file which is usually included in the .cdl file to determine the cell modifier list for the cell.
- CSC - Call Scheduler. This process manages and invokes applications to be executed at a particular date and time.
- SAD - System Administration Daemon. Manages requests from SAI and XAI processes. Also this process spawns and kills user functions, sends open and close database requests for SQL message and information databases.
- SYS - System Configuration Library. Provides common routines used to access the system configuration file.

System Management Subsystem (SMS). Contains tools and processes which help the user execute management functions. These functions include application management, prompt management, system configuration and database editing.

- SAI - System Administration Interface. Curses based process which allows users to manage applications.
- SMI - System Maintenance Interface. Curses based process which allows the user to send and receive commands directly to/from an MRS.
- PLF - Prompt Loading Facility. Curses based process which allows users to create, delete, backup and restore prompts.
- SDE - System Database Editor. Curses based process which allows users to create message and information databases and edit information databases.
- SCM - System Configuration Manager. Curses based process which allows users to create and edit system configuration parameters.

DBMS Support Subsystem (SQL). Contains processes which send SQL queries from IVR applications to third party DBMS processes.

- QDS - Query DBMS server. This process manages SQL requests from IVR applications and routes them to the appropriate database server described below.
- GDS - Generic DB Server. This directory contains the sources needed to build the processes which send SQL requests from the AP to a third party database manager. The processes currently created in this directory are the IDS, Ingres DB Server, ODS, Oracle DB Server, SDS, Sybase DB Server and FDS, Informix Server.

MRS Controller Subsystem (VCS). Processes and tools which manage MRSs.

- PMG - Pool Manager Process. This process manages outdial channel resources. Whenever outdial channels are assigned to an application the PMG makes sure that only those channels are allocated to run that application. Any outdial channels that are not assigned to an application are put into a generic pool. When an application requests an outdial channel through the BOUT cell or when an application that is scheduled to run is finally invoked, the PMG allocates these channels from its generic pool.
- VIP - MRS Interface Process. This process maintains the state of a telephone call and translates IVR application requests into commands that an MRS can interpret.
- VRM - MRS Resource Manager. This process manages the resources which reside on the MRS. When an application request is received, the VRM assigns an available resource, if necessary, to the request. The VRM also determines which MRS the request is to be serviced on.
- VSN - VSN Map Update Tool. This tool allows the user to generate a data file on the host, which is used by the AP to determine which VSNs on the MRS are allocated and which are free.
- VFT - File Transfer Process. This process copies files on the host to/from the MRS(s) attached to the network.
- UEH - User Error Handler. This process collects all messages that are logged to the transaction log file and redirects them to a file or device specified by the user.

Terminal Resource Subsystem (TRS). Contains tools, libraries and processes which allow the AP to communicate with remote hosts.

- AUD - Audit process. This process requests historical data from other processes and makes sure that the data is reported in a clear format.
- TRSS - TRS session manager process. This process takes requests from IVR applications and routes them to the appropriate protocol handling process. Additionally, this process receives replies from the protocol handling processes and manages accordingly.
- TRSC - TRS protocol handling process. This process takes requests from the TRSS process and forwards them to the remote host using HLLAPI calls. The TRSC process controls a certain number of sessions running particular protocols such as 3270, VT100 and token ring. There may be numerous TRSC processes running at a particular time depending on which protocols and vendors of protocols are needed by an application.
- TRSA - TRS audit process. This process receives data from the AUD process, formats the data appropriately and logs it to a file.
- TRSL - TRS Logger Process. This process receives data from the TRSS and TRSC processes and writes this information to the trs.log file.

(VRT). Processes and tools used to manage AP and MRS processes.

- VRTD - Runtime Daemon. This process manages the starting and stopping of AP and MRS processes.
- PROC - Process Library. Directory of routines used by AP and to generically manage process functions such as starting, stopping and memory allocation.
- MSG - Messaging Library. Directory of routines used by AP and MRS software to provide a common communication interface between processes. Also the msg process is created in this directory. The msg process is the socket reader which takes data from the socket and places the data into the appropriate IPC queue.
- LOGCP - Log File compiler. Compiler which creates error string files which can be interpreted by the logger process and written to the transaction log file.
- DPND - Dependency Creator. Tools used during building of AP and MRS software to create dependency lists for make files.

- PTYPE - Prototype Tool. This tool is used during the building of AP and MRS software to perform prototype checking on C function routines.

X Manager Subsystem (XMS). Processes and tools to provide X user interfaces for various AP software administration purposes.

- XAE - X Application Editor. Graphical application editor. Allows users to create and edit applications.
- XPM - X Prompt Manager. Graphical interface which allows users to copy to/from the host and edit them.
- XAI - X System Monitor. Graphical interface which displays all MRSs in the network and status of the trunks in those MRSs.
- XBUP - X Backup Process. This process allows the user to backup and restore portions of the applications development environment to/from a device.
- XCONSOLE - AP software Console Process. This process displays error messages that are sent to it by other AP software processes. Furthermore, when the action CONSOLE is assigned to severity levels in the severity file, any error messages with those severities will be sent to the XCONSOLE.
- SAM - System Application Monitor. Curses and graphical interface which displays the cell transitions of an application at runtime.
- UIF - Process which provides graphical representation of various services available to the user.

Other processes

- The UPS PowerChute software is comprised of two modules:

  a A UPS Monitoring Module (upsd), which runs as a background process (daemon) and communicates with the UPS via the serial port.

  b A User Interface Module, which enables users to control and configure PowerChute plus through X-Windows GUI session. It also allows users to monitor the UPS through the Main Screen.

- The STAR Mirror software can execute to provide mirroring or striping, or any combination of these features. Symposium OPEN IVR 4.0 uses the mirroring option only. The software can be configured to automatically rebuild disk mirrors when the system is rebooted. This can be used to recover disk mirrors quickly after a disk failure and replacement cycle. The disk mirror process name is star.

Processes on the MRS

MRS software processes

Below is a description of the MRS processes:

- ACM - Aculab Channel Manager. Manages Aculab E1 cards.
- BAS - Backup Application Server. Runs embedded test application.
- CONV - Convert Tool. Converts ascii format to tiff format (used for fax).
- DCM - Dialogic Channel Manager. Manages Dialogic voice cards and analog interfaces.
- DTM - Dialogic T1 Manager. Manages T1 interfaces - T1 alarms mainly.
- HWM - Hardware Manager. Deals with alarms.
- PSM - Protocol State Machine. Responsible for overall system operation.
- SCI - Service Console Interface. User interface to manage and configure the server.
- UVM - UNIX Volume Manager. Manages file system.
- VRTD - Runtime Daemon. Responsible for starting all the processes and maintaining connection to AP.
- RMGR - Resource Manager. Manages all internal MRS resources.
- VXCC - External process to communicate directly to the psm, by-passing the main channel of communications between MRS and AP.
- ATTS - L&H TTS Manager. Manages text-to-speech for L&H on Antares.
- CTTS - TruVoice TTS Manager. Manages text-to-speech for TruVoice on Antares.
- BFC - Brooktrout Fax Manager. Manages fax for Brooktrout.

- GLFC - GammaLink Fax Manager. Manages fax for GammaLink.
- PURESP - Purespeech ASR Manager. Manages speech recognition for Purespeech on Antares.
- VCSANT - VCS/Antares ASR Manager. Manages speech recognition for VCS on Antares.
- VCS - VCS/VR160 ASR Manager. Manages speech recognition for VCS on VR/160.
- COM - Communications Protocol Manager.
- CCS - Country Configuration Server. Responsible for global tone detection.

Processes on the MRS/AP

The MRS/AP processes are the combination of the MRS and AP processes.

Chapter 4: System feature licensing

License manager

Licensed features are specified in a license file that contains plain text and encrypted information.

The license manager controls features ordered by customers as indicated in the license file, “license.dat”. Applications interface with the license manager to determine their licensing authorization.

Keylock device

The Dallas keylock (model DS1410E) serial number is used as the encryption/decryption key for the license file.

One keylock is used for every physical MRS/AP, MRS, or AP system. To ensure proper operation, the keylock device must at all times be connected to the parallel port on the serial/parallel port expansion card on the MRS/AP, AP or MRS as it will be checked by the license manager at boot-up and subsequently every 2 minutes.

License file

The license manager uses a license file to control features. This file contains a one-line entry for each controlled feature.

The following example is a small license file that supports 4 telephone lines, plus 4 lines for fax: (Back-slashes exist exactly as shown.)

```
SERVER appdevpl.nt.com NT_KEYLOCK=3FA0277801FE45D9 10050
DAEMON vtek .
INCREMENT genAP-odt-runtime vtek 04.000 1-jan-0000 1 1C32EEEC608D1F56C239 \
          ck=28
INCREMENT genAP-odt-fax vtek 04.000 1-jan-0000 4 EC421E6CF79AD607DA9C ck=92
INCREMENT genAP-odt-telephone vtek 04.000 1-jan-0000 4 3C220E4CAED11456967D \
          ck=64
INCREMENT genTSP-odt-runtime vtek 04.000 1-jan-0000 1 1CA28E7C82109E444F46 \
          ck=10
INCREMENT genTSP-odt-volumes vtek 04.000 1-jan-0000 2 AC227EACC21E24985690 \
          ck=14
INCREMENT genTSP-odt-telephone-d vtek 04.000 1-jan-0000 4 ECD2DE2CE13A762C173D \
          ck=104
INCREMENT genTSP-odt-fax-b vtek 04.000 1-jan-0000 4 4C723EDCA9078A8974A5 ck=34
```

Each line of a license file begins with a keyword. Unrecognized keywords are taken to indicate comment lines. The license feature lines begin with the keyword INCREMENT and have the following fields:

- a feature name (e.g. genAP-odt-nortel-IPML)
- daemon name (i.e. “vtek”)
- version (e.g. 04.000)
- expiry date (e.g. 1-jan-0000)
- number of licenses (e.g. 64, or 0/1 for no/yes)
- encrypted authentication key (e.g. EC421E6CF79AD607DA9C)

The expiry date field allows arbitrary expiry dates to be assigned on a per-feature basis. An expiry date of 1-jan-0000 means “never expire”.

License check failure

A license check failure may be caused by:

- the absence of a License Manager security keylock
- a faulty License Manager security keylock connection
- detection of a different License Manager security keylock than the specific one for which the system was manufactured.

In the event of a license check failure, contact Nortel Customer Service for assistance. If the failure is not rectified, the system will be shut down after four days. Once the failure is rectified, the scheduled shut-down will be cancelled.

> ***Note:*** The interval of four days can be adjusted to a lower value, on a site-specific basis; however, the interval cannot be increased.

If the check fails at MRS or AP start-up, an error message is logged to the `kld.log` file. This message includes a timestamp indicating when the message was logged, and the date and time on which the system will shut down if corrective action is not taken. The message is also displayed on the X-console window. To ensure that the license file check failure is noticed in time to take corrective action, certain site-specific actions can be triggered through the severity file, such as sending an e-mail to an administrator, or paging appropriate personnel.

If the AP fails the start-up license check, the AP will not start. If the MRS fails the start-up license check, the MRS will start but with zero resources.

After successful start-up, if the check fails subsequent periodic checks, an information message is logged indicating that the keylock was absent during a license check. Any running applications, which previously passed a licensing check and successfully checked out resources, will continue to run independently of the success or failure of licensing checks by other applications.

Please refer to the system capacity section of this document for the maximum supported value in an integer range. Some features may be currently free of charge from Nortel.

Field license file delivery

A node is a primary AP, its redundant (if any), and the MRS(s) for which it is primary. An MRS/AP is also considered a node. Each AP, MRS or MRS/AP within a node is considered a unit.

License files for all computers in a release 4.0 node will be delivered to customers in the format of a standard DOS disk of files. These license files are always based upon the total configuration, not upon a delta from a previous configuration.

The license file for each computer (AP, MRS or MRS/AP) in the release 4.0 node must be identified on the DOS disk as follows:

a:\<order#>00.<file-type> for AP 1
a:\<order#>99.<file-type> for AP 2 (redundant-AP)
a:\<order#>01.<file-type> for MRS 1
a:\<order#>02.<file-type> for MRS 2
a:\<order#>03.<file-type> for MRS 3
a:\<order#>04.<file-type> for MRS 4
a:\<order#>88.<file-type> for MRS/AP

<order#>

Here <order#> is suggested to be the system order number, but it can be anything conforming to DOS filename conventions.

<file-type>

<file-type> must be “lic” if the license file is in the unmodified format produced by the Base License File Generator (without the addition of the optional checksum).

<file-type> must be “kcd” if the license was produced by the Base License File Generator with the addition of the optional checksum, and subsequently modified to conform with Nortel’s KCD Envelope Format.

The last two characters before the filename extension are significant, and indicate the identity of the computer in the release 4.0 system, (MRS1, MRS2, etc.). This encoding is used during installation to assist in the automatic distribution of licenses.

A utility allows distributors to update all their licenses used within a node using the primary AP in the node. The utility also works with the MRS/AP (the MRS/AP is the only unit in the node). This utility will be built on SCO ftp. This utility will use the "**`/etc/hosts`**" file on the primary AP or on the MRS/AP. The "hosts" file will contain IP addresses and aliases for "ap1", "ap2", "mrs1", "mrs2", "mrs3", "mrs4", and "mrsap" as required. Table 4-1 shows **`hosts`** entries that support an AP and two MRS systems.

Table 4-1: Example host entries

IP Address	Hostname	Host.domain	Alias
128.0.0.1	localhost	localhost	
47.235.23.45	alpha	alpha.ivr.com	nt_ap1
47.235.23.47	delta	delta.ivr.com	nt_mrs1
47.235.23.49	gamma	gamma.ivr.com	nt_mrs2

Customers may change the IP addresses and other aliases for systems, but they should retain the given Symposium OPEN IVR 4.0 system aliases (nt_ap1, nt_ap2, nt_mrs1, nt_mrs2,nt_ mrs3,nt_ mrs4, and nt_mrsap) so that the utility can function.

Antares dongles (license manager security keylocks)

Symposium OPEN IVR 4.0 supports the following speech recognition technology providers on the Antares board:

- VCS ASR (continuous and discrete)
- PureSpeech ASR (Recite Continuous Digits, Recite Lite, Recite PRO and Recite IQ)

Symposium OPEN IVR 4.0 also supports the following text-to-speech technology providers on the Antares board:

- TruVoice TTS
- L&H TTS

All speech recognition and text-to-speech technologies are controlled by the Symposium OPEN IVR 4.0 license manager. In addition, VCS ASR, TruVoice TTS and L&H TTS are controlled by using a keylock device (dongle) on the Antares board. This requirement is summarized in Table 4-2.

Table 4-2: Antares license manager security keylocks

Speech technology	Requires Antares license manager security keylock
L&H TTS	Yes
TruVoice TTS	Yes
Purespeech ASR	No
VCS Antares ASR	Yes

Chapter 5: System configuration

Overview

This chapter provides system configuration information for a Symposium OPEN IVR 4.0 system on both release 2 and release 4 hardware.

All tables in this chapter contain exact values as referenced under SCO Unix 3.2 v5.0.4c.

System connectivity

Figure 5-1: Folded system (MRS/AP) connectivity

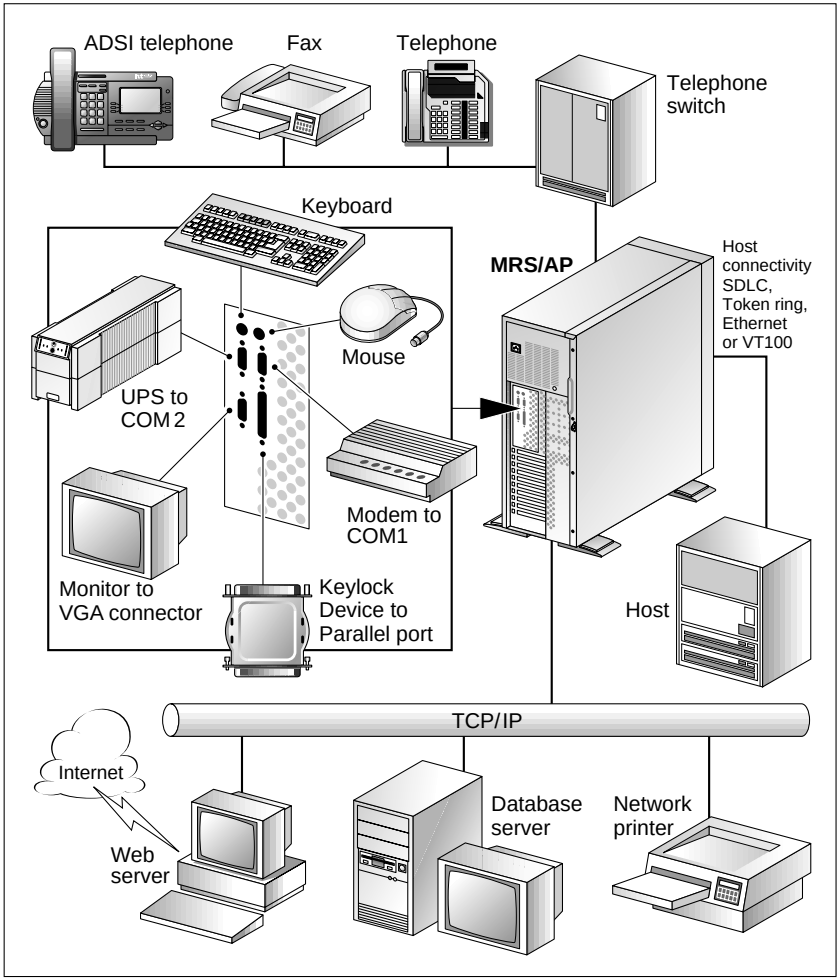
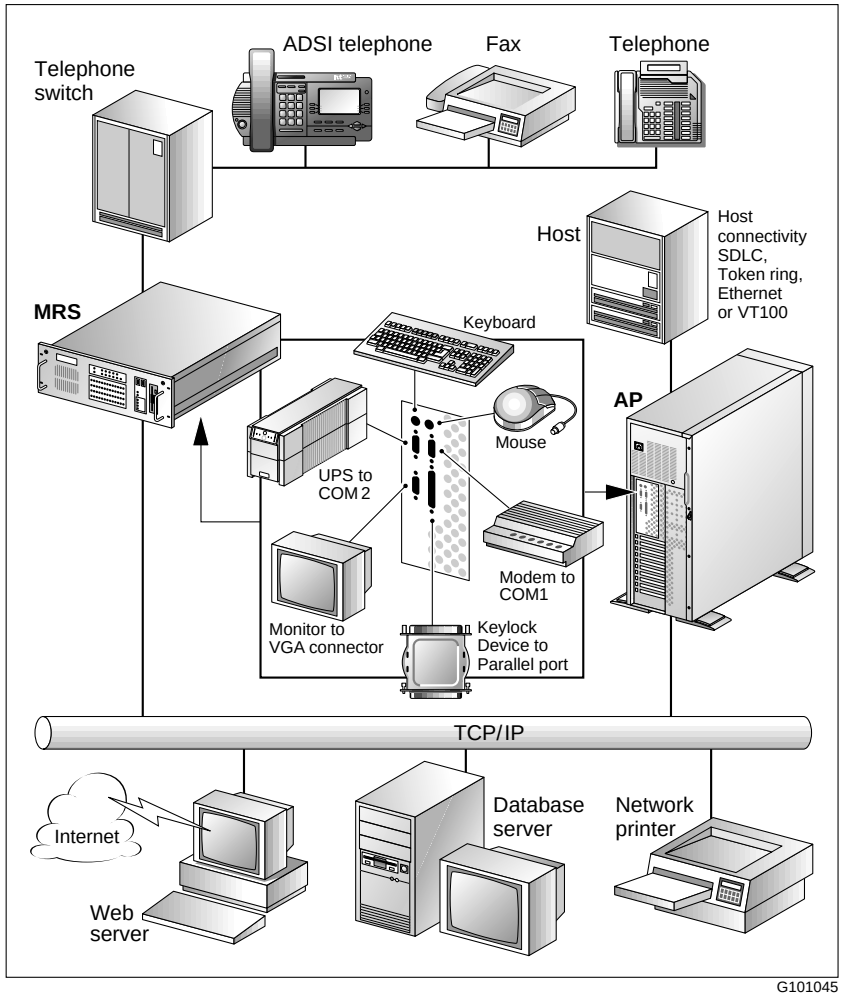


Figure 5-2: Unfolded system (MRS and AP) connectivity



The Dallas keylock must be attached to LPT1. LPT1 is on the serial/parallel card on R2 MRS systems.

R2 AP configuration values

Video configuration values

Table 5-1: 14” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD542X	Other 14 inch	800x600	256	72 Hz

Table 5-2: 17” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD542X	Other 17 inch	1024x768	256	70 Hz

Table 5-3: 21” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD542X	Other 21 inch	1024x768	256	70 Hz

COM 1 configuration values

Table 5-4: R2 AP COM 1

Device description	Used for	Device name	Speed	Line-mode label	Login/ answer	Receive buffer
IBM-COM1[a]	Modem	tty1A	115200	q	enabled	4

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

COM 2 configuration values

Table 5-5: R2 AP COM 2

Device description	Used for	Device name	Speed	Line-mode label	Login/ answer	Receive buffer
IBM-COM2[a]	UPS	tty2a	9600	m	disabled	14

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

Parallel port configuration values

Table 5-6: R2 AP parallel port

Device description	Device name	I/O address	IRQ
Parallel adapter[a]	/dev/lp0	378-37F	7

a. Only network printers are supported.

Mouse port configuration values

Table 5-7: R2 AP mouse port

Device description	Device name	Associations
High resolution keyboard mouse	/dev/mouse/kb0	tty01, tty02, tty03, tty04, tty05, tty06, tty07, tty08, tty09, tty10, tty11, tty12, console

Ethernet LAN card configuration values

Table 5-8: R2 AP Ethernet LAN card

Device name	I/O address	Interrupt vector	Shared RAM	Protocol
SMC 8216 Ethercard Ultra	240	2	CC000-CFFF F (16K)	SCO TCP/IP

Note: Refer to the platform specific, I/O, DMA, and IRQ map

Token Ring LAN card configuration values

Table 5-9: R2 AP Token Ring LAN card

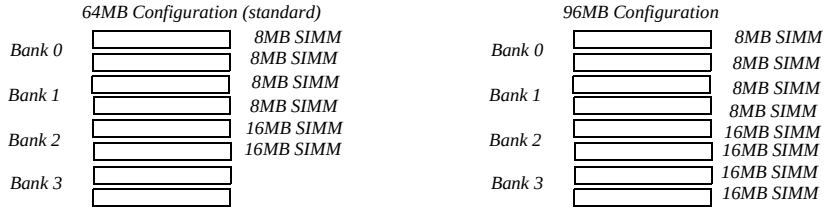
Device name	I/O location	Transfer mode	Protocol
Madge Smart AT Plus adapter	1A20	DMA	SCO TCP/IP

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map

System memory configurations

Only the following DRAM configurations are supported:

Figure 5-3: Supported DRAM configurations



SCSI ID configuration values

Note 1: Remove the Narrow SCSI Terminating resistors from the motherboard.

Note 2: The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-10: R2 AP SCSI ID configuration

SCSI ID[a]	Device	Comments
0	First disk	Should always be located in top left drive bay (Wide-SCSI distribution)
1	Second disk	Should always be located in top middle drive bay (Wide-SCSI distribution)
2	Tape drive	Terminated (Narrow SCSI distribution)
5	CDROM drive	Not terminated (Narrow SCSI distribution)
7	SCSI controller	PCI Adaptec controller

a. The incorrect setting of SCSI Ids and/or the insertion of disk drives into incorrect drive bays can cause data loss and corruption on systems utilizing disk mirroring.

R2 AP memory, I/O, DMA, and IRQ map

Table 5-11: R2 AP memory, I/O, DMA, and IRQ map

IRQ	Device Type	Shared Memory Address Range	I/O Address	DMA Channel
0	Internal Timer	-	-	-
1	Keyboard Buffer	-	-	-
2	Same as IRQ 9	-	-	-
3	COM 2 (UPS)	-	0x2F8 - 0x2FF	-
4	COM 1 (Modem)	-	0x3F8 - 0x3FF	-
5	Available	-	-	-
6	Floppy Device	-	0x3F2 - 0x3F7	2
7	Parallel Port/Dongle	-	0X378 - 0X37F	-
8	Clock/Calendar	-	0x070 - 0x07F	-
9	Available	-	-	-
10	Madge Token Ring (LAN)	-	0x1A20 - 0x1A2F	6
11	SCSI Controller (PCI)	0xCC000 - 0xCFFFF	0x6000 - 0x60FF	-
	VGA Controller	0xA0000 - 0xCBFFF	-	-
	Zynx Ethernet (LAN)	-	0xF880 - 0xF8FF	-
	3COM Ethernet (CCIP) [4]	-	0x6100 - 0x611F	-
12	Keyboard Mouse	-	0x060 - 0x064	-
13	FPU (Floating Point Unit)	-	-	-
14 [3]	Available	-	-	-
15 [1]	Madge Token Ring (Host) [2]	-	0x3A20 - 0x3A2F	5
	Sync 570 SDLC [2]	0xDC000 - 0xDFFFF	0x310 - 0x31F	-
-	Digi PC/Xe VT-100 [2]	0xD8000 - 0xD9FFF	0x300	-
-	Digi PC/Xem VT-100 [2]	0xD8000 - 0xDFFFF	0x114	-
-	640 K System RAM	0x00000 - 0x9FFFF	-	-
-	Mono Video Buffer	0xB0000 - 0xB7FFF	-	-
-	BIOS and Basics	0xF0000 - 0xFFFFF	-	-
-	Extended RAM	0x100000 - 0xFDFFFF	-	-

1. Cards using the same IRQ and appearing in a shaded row are mutually exclusive
2. Only one host card is supported
3. IDE controller must be disabled
4. A second Ethernet card for CCIP is optional, but not required.

R2 MRS/AP (700t) configuration values

Video configuration values

Table 5-12: 14” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD542X	Other 14 inch	800x600	256	72 Hz

Table 5-13: 17” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD542X	Other 17 inch	1024x768	256	70 Hz

Table 5-14: 21” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD542X	Other 21 inch	1024x768	256	70 Hz

COM 1 configuration values

Table 5-15: R2 MRS/AP COM1

Device description	Used for	Device name	Speed	Line-mode label	Login/answer	Receive buffer
IBM-COM1[a]	Modem	tty1A	115200	q	enabled	4

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

COM 2 configuration values

Table 5-16: R2 MRS/AP COM 2

Device description	Used for	Device name	Speed	Line-mode label	Login/answer	Receive buffer
IBM-COM2[a]	UPS	tty2a	9600	m	disabled	14

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

Parallel port configuration values

Table 5-17: R2 MRS/AP parallel port

Device description	Device name	I/O address	IRQ
Parallel adapter[a]	/dev/lp0	378-37F	7

a. Only network printers are supported.

Mouse port configuration values

Table 5-18: R2 MRS/AP mouse port

Device description	Device name	Associations
High resolution keyboard mouse	/dev/mouse/kb0	tty01, tty02, tty03, tty04, tty05, tty06, tty07, tty08, tty09, tty10, tty11, tty12, console

Ethernet LAN card configuration values

Table 5-19: R2 MRS/AP Ethernet LAN card

Device name	Unit number	PCI bus number	PCI Device number	Network media type	Protocol
ZNYX ZX312 PCI EtherAction	0	0	12	1	SCO TCP/IP

Token Ring LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

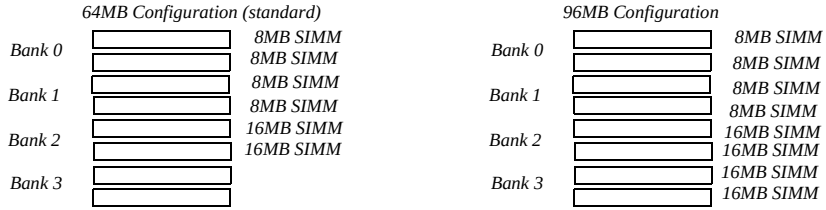
Table 5-20: R2 MRS/AP Token Ring LAN card

Device name	I/O location	Transfer mode	Protocol
Madge Smart AT Plus adapter	1a20	DMA	SCO TCP/IP

System memory configurations

Only the following DRAM configurations are supported:

Figure 5-4: Supported DRAM configurations



SCSI ID configuration values

Note 1: Remove the Narrow SCSI Terminating resistors from the motherboard.

Note 2: The 3.5" floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-21: R2 MRS/AP SCSI ID configuration

SCSI ID[a]	Device	Comments
0	First disk	Should always be located in top left drive bay (Wide-SCSI distribution)
1	Second disk	Should always be located in top middle drive bay (Wide-SCSI distribution)
2	Tape drive	Terminated (Narrow SCSI distribution)
5	CDROM drive (optional)	Not terminated (Narrow SCSI distribution)
7	SCSI controller	PCI Adaptec controller

a. The incorrect setting of SCSI Ids and/or the insertion of disk drives into incorrect drive bays can cause data loss and corruption on systems utilizing disk mirroring.

R2 MRS/AP memory, I/O, DMA, and IRQ map

Table 5-22: R2 MRS/AP memory, I/O, DMA, and IRQ map.

IRQ	Device Type	Shared Memory Address Range	I/O Address	DMA Channel
0	Internal Timer	-	-	-
1	Keyboard Buffer	-	-	-
2	Same as IRQ 9	-	-	-
3 [1]	COM 2 (UPS)	-	0x2F8 - 0x2FF	-
	Madge Token Ring (LAN) [8]	-	0x1A20 - 0x1A2F	6
4	COM 1 (Modem)	-	0x3F8 - 0x3FF	-
5 [1]	D/41ESC	0xD0000 - 0xD1FFF	-	-
	D/240SC-T1	0xD0000 - 0xD7FFF	-	-
	D/320SC	0xD0000 - 0xD7FFF	-	-
6	Floppy Device	-	0x3F2 - 0x3F7	2
7	Parallel Port/Dongle	-	0X378 - 0X37F	-
8	Clock/Calendar	-	0x070 - 0x07F	-
9 [1]	Antares 2000/33/50	-	0x210 - 0x217	-
	Madge Token Ring (LAN) [8]	-	0x1A20 - 0x1A2F	6
10 [1]	VR160 [8]	0xD8000 - 0xD9FFF	0x200 - 0x203	-
	D/81B	0xD0000 - 0xD3FFF	0x340 - 0x343	-
	D/121B	0xD0000 - 0xD5FFF	0x340 - 0x343	-
	Madge Token Ring (Host) [2 9]	-	0x3A20 - 0x3A2F	5
	Sync 570 SDLC [2 9]	0xDC000 - 0xDFFFF	0x310 - 0x31F	-
11	SCSI Controller (PCI)	0xCC000 - 0xCFFFF	0xFC00 - 0xFCFF	-
	VGA Controller	0xA0000 - 0xCBFFF	-	-
	Zynx Ethernet (PCI)	-	0xF880 - 0xF8FF	-
	3COM Ethernet (CCIP) [10]	-	0x6100 - 0x611F	-
12	Keyboard Mouse	-	0x060 - 0x064	-
13	FPU (Floating Point Unit)	-	-	-
14 [3]	Brooktrout Fax	-	0x120 [5]	-
15 [1]	Aculab E1 (Rev 4)	0xE0000 - 0xEFFFF [4]	0x320 - 0x323	
	Madge Token Ring (Host) [2 9]	-	0x3A20 - 0x3A2F	5
	Sync 570 SDLC [2 9]	0xDC000 - 0xDFFFF	0x310 - 0x31F	-
-	LSI/80	-	-	-
-	LSI/120	-	-	
-	Digi PC/Xe VT-100 [2]	0xD8000 - 0xD9FFF [6]	0x300	-
		0xE0000 - 0xE1FFF [7]	0x300	
-	Digi PC/Xem VT-100 [2]	0xD8000 - 0xDFFFF [6]	0x114	
-		0xE0000 - 0xECFFF [7]	0x114	-
-	640 K System RAM	0x00000 - 0x9FFFF	-	-
-	Mono Video Buffer	0xB0000 - 0xB7FFF	-	-
-	BIOS and Basics	0xF0000 - 0xFFFFF	-	-
-	Extended RAM	0x100000 - 0xFDFFFF	-	-

[1] Cards using the same IRQ and appearing in a shaded row are mutually exclusive, except for the VR160 which may co-exist with the D/81B or D/121B.

[2] Only one host card is supported

[3] IDE controller must be disabled

[4] ROM BIOS shadowing must be disabled for this memory range if this card is installed.

[5] Refer to Channel Addresses Table for detailed I/O address information.

[6] Use this memory range if the system contains an Aculab E1 card but not a VR160.

[7] Use this memory range if the system does not contain an Aculab E1 card.

[8] Use IRQ 9 if the system does not contain an Antares card otherwise use IRQ 3.

[9] Use IRQ 15 if the system does not contain an Aculab E1 card otherwise use IRQ 10, unless the system contains a VR160.

[10] A second Ethernet card for CCIP is optional, but not required.

note: TTS, UPS and Madge Token Ring LAN cannot all co-exist in the same 700t MRS/AP.

R2 MRS/Tower and MRS/Rack configuration values

Video configuration values

Monitors are not supported on the R2 MRS/Tower and MRS/Rack. A VT100 terminal must be used if a console interface is required.

COM 1 configuration values

Table 5-23: R2 MRS/Tower and MRS/Rack COM 1

Device description	Used for	Device name	Speed	Line-mode label	Login/answer	Receive buffer
IBM-COM1[a]	Modem	tty1A	115200	q	enabled	4

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

COM 2 configuration values

Table 5-24: R2 MRS/Tower and MRS/Rack COM 2

Device description	Used for	Device name	Speed	Line-mode label	Login/answer	Receive buffer
IBM-COM2[a]	UPS	tty2a	9600	m	disabled	14

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

Parallel port configuration values

Table 5-25: R2 MRS/Tower and MRS/Rack parallel port [a]

Device description	Device name	I/O address	IRQ
Parallel adapter[b]	/dev/lp0	378-37F	7

[a] Parallel port 1 is on the serial/parallel expansion card and not on the CPU card.

[b] Only network printers are supported.

Mouse port configuration values

Mouse is not available on R2 MRS/Tower and MRS/Rack platforms.

Ethernet LAN card configuration values

Note: Refer to the platform specific Memory, I/O, DMA, and IRQ map.

Table 5-26: R2 MRS/Tower and MRS/Rack Ethernet LAN card[1]

Device name	I/O address	Interrupt vector	Shared ram	Protocol
SMC 8216 Ethercard Ultra	240	2	DC000-DFFFF (16K)	SCO TCP/IP

Token Ring LAN card configuration values

Note: Refer to the platform specific Memory, I/O, DMA, and IRQ map.

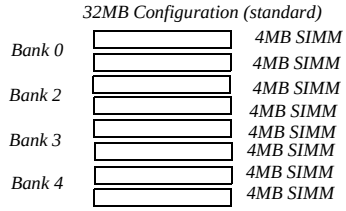
Table 5-27: R2 MRS/Tower and MRS/Rack Token Ring LAN card

Device name	I/O location	Transfer mode	Protocol
Madge Smart AT Plus adapter	1a20	DMA	SCO TCP/IP

System memory configurations

Only the following DRAM configuration is supported:

Figure 5-5: Supported DRAM configuration



1. Refer to the platform specific Memory, I/O, DMA, and IRQ map

SCSI ID configuration values

Note: The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-28: R2 MRS/Tower and MRS/Rack SCSI ID configuration[1]

SCSI ID[a]	Device	Comments
0	First disk	Terminate at end of chain
1	Second disk	Must set jumper settings on the drive
2	External tape drive	Do not terminate
3	Third disk	Must set jumper settings on the drive
4	Fourth disk	Must set jumper settings on the drive
5	CDROM drive (available only on the MRS/Tower)	Not terminated (Narrow SCSI distribution)
6	DAT drive (available only on the MRS/Tower)	Not terminated (Narrow SCSI distribution)
7	SCSI controller	Adaptec controller

a. The incorrect setting of SCSI Ids and/or the insertion of disk drives into incorrect drive bays can cause data loss and corruption on systems utilizing disk mirroring.

1. The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

MRS/Tower - MRS/Rack memory, I/O, DMA, and IRQ map

Table 5-29: R2 MRS/Tower and MRS/Rack memory, I/O, DMA, and IRQ map

IRQ	Device type	Shared memory address range	I/O address	DMA channel
0	Internal timer	-	-	-
1	Keyboard buffer	-	-	-
2	Same as IRQ 9	-	-	-
3	COM 2 (UPS)	-	0x2F8 - 0x2FF	-
4	COM 1 (Modem)	-	0x3F8 - 0x3FF	-
5 [1]	D/41ESC	0xD0000 - 0xD1FFF	-	-
	D/240SC-T1	0xD0000 - 0xD7FFF	-	-
	D/320SC	0xD0000 - 0xD7FFF	-	-
6	Floppy device	-	0x3F2 - 0x3F7	2
7	Parallel port/Dongle	-	0X378 - 0X37F	-
8	Clock/Calendar	-	0x070 - 0x07F	-
9 [1]	Madge Token Ring (LAN)	-	0x1A20 - 0x1A2F	6
	SMC Ethernet (LAN)	0xDC000 - 0xDFFFF	0x240 - 0x25F	-
10 [1]	VR160 [2]	0xD8000 - 0xD9FFF	0x200 - 0x203	-
	D/81B	0xD0000 - 0xD3FFF	0x340 - 0x343	-
	D/121B	0xD0000 - 0xD5FFF	0x340 - 0x343	-
11	SCSI controller (ISA)	0xCC000 - 0xCFFFF	0x330 - 0x333	5
12	Antares 2000/33/50	-	0x210 - 0x217	-
13	FPU (Floating Point Unit)	-	-	-
14 [3]	Brooktrout fax	-	0x120 [5]	-
15	Aculab E1 (Rev 4)	0xE0000 - 0xEFFFF [4]	0x320 - 0x323	
-	LSI/80	-	-	-
-	LSI/120	-	-	
-	640 K system RAM	0x00000 - 0x9FFFF	-	-
-	Mono video buffer	0xB0000 - 0xB7FFF	-	-
-	BIOS and basics	0xF0000 - 0xFFFFF	-	-
-	Extended RAM	0x100000 - 0xFDFFFF	-	-

1. Cards using the same IRQ and appearing in a shaded row are mutually exclusive
2. The VR160 may co-exist with the D/81B or D/121B.
3. IDE controller must be disabled
4. ROM BIOS shadowing must be disabled for this memory range if this card is installed.
5. Refer to Channel Addresses Table for detailed I/O address information.

Tower AP (300tp) configuration values

Video configuration values

Table 5-30: 14” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 14 inch	800x600	256	70 Hz

Table 5-31: 17” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 17 inch	1024x768	256	70 Hz

Table 5-32: 21” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 21 inch	1280x1024	256	70 Hz

COM 1 configuration values

Table 5-33: Tower AP COM 1

Device description	Used for	Device name	Speed	Line-mode label	Login/answer	Receive buffer
IBM-COM1[a]	Modem	tty1A	115200	q	enabled	4

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

COM 2 configuration values

Table 5-34: Tower AP COM 2

Device description	Used for	Device name	Speed	Line-mode label	Login/answer	Receive buffer
IBM-COM2[a]	UPS	tty2a	9600	m	disabled	14

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

Parallel port configuration values

Table 5-35: Tower AP parallel port

Device description	Device name	I/O address	IRQ
Parallel adapter[a]	/dev/lp0	378-37F	7

a. Only network printers are supported.

Mouse port configuration values

Table 5-36: Tower AP mouse port

Device description	Device name	Associations
High resolution keyboard mouse	/dev/mouse/kb0	tty01, tty02, tty03, tty04, tty05, tty06, tty07, tty08, tty09, tty10, tty11, tty12, console

Ethernet LAN card configuration values

Note: Refer to the platform specific Memory, I/O, DMA, and IRQ map.

Table 5-37: Tower AP Ethernet LAN card

Device name	PCI bus	Device number	Function	Protocol
3COM EtherLink XL PCI (3C900)	0	18	0	SCO TCP/IP

Token Ring LAN card configuration values

Note: Refer to the platform specific Memory, I/O, DMA, and IRQ map.

Table 5-38: Tower AP Token Ring LAN card

Device name	I/O location	Transfer mode	Protocol
Madge Smart AT Plus adapter	1a20	DMA	SCO TCP/IP

System memory configurations

Only the following DRAM configurations are supported:

Table 5-39: Supported DRAM configurations

Bank 0 (SIMM 1, 2)	Bank 1 (SIMM 3, 4)	Total Memory
32 Mbytes	Empty	64 Mbytes (standard)
32 Mbytes	32 Mbytes	128 Mbytes

SCSI ID configuration values

Note: The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-40: Tower AP SCSI ID configuration[1]

SCSI ID[a]	Device	Comments
0	First disk	Not terminated
1	Second disk	Must set jumper settings on the drive
2	Tape drive	Terminated (Narrow SCSI distribution)
5	CDROM drive	Not terminated (Narrow SCSI distribution)
7	SCSI controller	PCI Adaptec controller

a. The incorrect setting of SCSI Ids and/or the insertion of disk drives into incorrect drive bays can cause data loss and corruption on systems utilizing disk mirroring.

1. The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Tower AP memory, I/O, DMA, and IRQ map

Table 5-41: Tower AP memory, I/O, DMA, and IRQ map

IRQ	Device type	Shared memory address range	I/O address	DMA channel
0	Internal timer	-	-	-
1	Keyboard buffer	-	-	-
2	Same as IRQ 9	-	-	-
3	COM 2 (UPS)	-	0x2F8 - 0x2FF	-
4	COM 1 (Modem)	-	0x3F8 - 0x3FF	-
5	Available	-	-	-
6	Floppy device	-	0x3F2 - 0x3F7	2
7	Parallel port/Dongle	-	0X378 - 0X37F	-
8	Clock/Calendar	-	0x070 - 0x07F	-
9	Available	-	-	-
10	Madge Token Ring (LAN)	-	0x1A20 - 0x1A2F	6
11	SCSI controller (PCI)	0xCC000 - 0xCFFFF	0x6000 - 0x60FF	-
	VGA controller	0xA0000 - 0xCBFFF	-	-
	3COM Ethernet (LAN)	-	0x6400 - 0x641F	-
	3COM Ethernet (CCIP) [4]	-	0x6100 - 0x611F	-
12	Keyboard mouse	-	0x060 - 0x064	-
13	FPU (Floating Point Unit)	-	-	-
14 [3]	Available	-	-	-
15 [1]	Madge Token Ring (Host) [2]	-	0x3A20 - 0x3A2F	5
	Sync 570 SDLC [2]	0xDC000 - 0xDFFFF	0x310 - 0x31F	-
-	Digi PC/Xem VT-100 [2]	0xD8000 - 0xDFFFF	0x304	-
-	640 K system RAM	0x00000 - 0x9FFFF	-	-
-	Mono video buffer	0xB0000 - 0xB7FFF	-	-
-	BIOS and basics	0xF0000 - 0xFFFFF	-	-
-	Extended RAM	0x100000 - 0xFDFFFF	-	-

[1] Cards using the same IRQ and appearing in a shaded row are mutually exclusive

[2] Only one host card is supported

[3] IDE controller must be disabled

[4] A second Ethernet card for CCIP is optional, but not required.

MRS/AP (300tp) configuration values

Video configuration values

Table 5-42: 14” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 14 inch	800x600	256	70 Hz

Table 5-43: 17” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 17 inch	1024x768	256	70 Hz

Table 5-44: 21” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 21 inch	1280x1024	256	70 Hz

COM 1 configuration values

Table 5-45: MRS/AP COM 1

Device description	Used for	Device name	Speed	Line-mode label	Login/answer	Receive buffer
IBM-COM1[a]	Modem	tty1A	115200	q	enabled	4

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

COM 2 configuration values

Table 5-46: MRS/AP COM 2

Device description	Used for	Device name	Speed	Line-mode label	Login/answer	Receive buffer
IBM-COM2[a]	UPS	tty2a	9600	m	disabled	14

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

Parallel port configuration values

Table 5-47: MRS/AP parallel port

Device description	Device name	I/O address	IRQ
Parallel adapter[a]	/dev/lp0	378-37F	7

a. Only network printers are supported.

Mouse port configuration values

Table 5-48: MRS/AP mouse port

Device description	Device name	Associations
High resolution keyboard mouse	/dev/mouse/kb0	tty01, tty02, tty03, tty04, tty05, tty06, tty07, tty08, tty09, tty10, tty11, tty12, console

Ethernet LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-49: MRS/AP Ethernet LAN card

Device name	PCI bus	Device number	Function	Protocol
3COM EtherLink XL PCI (3C900)	0	18	0	SCO TCP/IP

Token Ring LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-50: MRS/AP Token Ring LAN card

Device name	I/O location	Transfer mode	Protocol
Madge Smart AT Plus adapter	1a20	DMA	SCO TCP/IP

System memory configurations

Only the following DRAM configurations are supported:

Table 5-51: Supported DRAM configurations

Bank 0 (SIMM 1, 2)	Bank 1 (SIMM 3, 4)	Total Memory
32 Mbytes	Empty	64 Mbytes (standard)
32 Mbytes	32 Mbytes	128 Mbytes

SCSI ID configuration values

Note: The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-52: MRS/AP SCSI ID configuration

SCSI ID[a]	Device	Comments
0	First disk	Not terminated
1	Second disk	Must set jumper settings on the drive
2	Tape drive	Terminated (Narrow SCSI distribution)
5	CDROM drive	Not terminated (Narrow SCSI distribution)
7	SCSI controller	PCI Adaptec controller

a. The incorrect setting of SCSI Ids and/or the insertion of disk drives into incorrect drive bays can cause data loss and corruption on systems utilizing disk mirroring.

MRS/AP memory, I/O, DMA, and IRQ map

Table 5-53: MRS/AP memory, I/O, DMA, and IRQ map

IRQ	Device type	Sharedmemory address range	I/O address	DMA channel
0	Internal timer	-	-	-
1	Keyboard buffer	-	-	-
2	Same as IRQ 9	-	-	-
3	COM 2 (UPS)	-	0x2F8 - 0x2FF	-
4	COM 1 (Modem)	-	0x3F8 - 0x3FF	-
5 [1]	D/41ESC	0xD0000 - 0xD1FFF	-	-
	D/160SC-LS	0xD0000 - 0xD7FFF	-	-
	D/240SC-T1	0xD0000 - 0xD7FFF	-	-
	D/320SC	0xD0000 - 0xD7FFF	-	-
6	Floppy device	-	0x3F2 - 0x3F7	2
7	Parallel port/Dongle	-	0X378 - 0X37F	-
8	Clock/Calendar	-	0x070 - 0x07F	-
9	Antares 2000/50	-	0x210 - 0x217	-
10	Madge Token Ring (LAN)	-	0x1A20 - 0x1A2F	6
11	SCSI controller (PCI)	0xCC000 - 0xCFFFF	0x6000 - 0x60FF	-
	VGA controller	0xA0000 - 0xCBFFF	-	-
	3COM Ethernet (LAN)	-	0x6400 - 0x641F	-
	3COM Ethernet (CCIP) [6]	-	0x6100 - 0x611F	-
12	Keyboard mouse	-	0x060 - 0x064	-
13	FPU (Floating Point Unit)	-	-	-
14 [3]	Aculab E1 (Rev 5)	0xE0000 - 0xE3FFF [4]	0x320 - 0x323	-
15 [1]	Madge Token Ring (Host) [2]	-	0x3A20 - 0x3A2F	5
	Sync 570 SDLC [2]	0xDC000 - 0xDFFFF	0x310 - 0x31F	-
-	GammaFax	-	0x358 [5]	-
-	Digi PC/Xem VT-100 [2]	0xD8000 - 0xDFFFF	0x304	-
-	640 K system RAM	0x00000 - 0x9FFFF	-	-
-	Mono video buffer	0xB0000 - 0xB7FFF	-	-
-	BIOS and basics	0xF0000 - 0xFFFFF	-	-
-	Extended RAM	0x100000 - 0xFDFFFF	-	-

1. Cards using the same IRQ and appearing in a shaded row are mutually exclusive
2. Only one host card is supported
3. IDE controller must be disabled
4. ROM BIOS shadowing must be disabled for this memory range if this card is installed.
5. Refer to Channel Addresses Table for detailed I/O address information.
6. A second Ethernet card for CCIP is optional, but not required.

MRS/Tower (700tp) configuration values

Video configuration values

Table 5-54: 14” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 14 inch	800x600	256	70 Hz

Table 5-55: 17” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 17 inch	1024x768	256	70 Hz

Table 5-56: 21” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 21 inch	1280x1024	256	70 Hz

COM 1 configuration values

Table 5-57: MRS/Tower COM 1

Device Description	Used for	Device name	Speed	Line-mode Label	Login/Answer	Receive Buffer
IBM-COM1[a]	Modem	tty1A	115200	q	enabled	4

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

COM 2 configuration values

Table 5-58: MRS/Tower COM 2

Device Description	Used for	Device name	Speed	Line-mode Label	Login/Answer	Receive Buffer
IBM-COM2[a]	UPS	tty2a	9600	m	disabled	14

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

Parallel port configuration values

Table 5-59: MRS/Tower parallel port

Device description	Device name	I/O address	IRQ
Parallel adapter[a]	/dev/lp0	378-37F	7

a. Only network printers are supported.

Mouse port configuration values

Table 5-60: MRS/Tower mouse port

Device description	Device name	Associations
High resolution keyboard mouse	/dev/mouse/kb0	tty01, tty02, tty03, tty04, tty05, tty06, tty07, tty08, tty09, tty10, tty11, tty12, console

Ethernet LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-61: MRS/Tower Ethernet LAN card

Device name	PCI bus	Device number	Function	Protocol
3COM EtherLink XL PCI (3C900)	0	18	0	SCO TCP/IP

Token Ring LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-62: MRS/Tower Token Ring LAN card

Device name	I/O location	Transfer mode	Protocol
Madge Smart AT Plus adapter	1a20	DMA	SCO TCP/IP

System memory configurations

Only the following DRAM configurations are supported:

Table 5-63: Supported DRAM configurations

Bank 0 (SIMM 1, 2)	Bank 1 (SIMM 3, 4)	Total Memory
32 Mbytes	Empty	64 Mbytes (standard)
32 Mbytes	32 Mbytes	128 Mbytes

SCSI ID configuration values

Note: The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-64: MRS/Tower SCSI ID configuration[1]

SCSI ID[a]	Device	Comments
0	First disk	Terminated
1	Second disk	Must set jumper settings on the drive
2	DAT tape drive (optional)	Not terminated (Narrow SCSI distribution)
5	CDROM drive (optional)	Not terminated (Narrow SCSI distribution)
7	SCSI controller	Adaptec controller

a. The incorrect setting of SCSI Ids and/or the insertion of disk drives into incorrect drive bays can cause data loss and corruption on systems utilizing disk mirroring.

1. The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

MRS/Tower memory, I/O, DMA, and IRQ map

Table 5-65: MRS/Tower memory, I/O, DMA, and IRQ map

IRQ	Device Type	Shared Memory Address Range	I/O Address	DMA Channel
0	Internal Timer	-	-	-
1	Keyboard Buffer	-	-	-
2	Same as IRQ 9	-	-	-
3	COM 2 (UPS)	-	0x2F8 - 0x2FF	-
4	COM 1 (Modem)	-	0x3F8 - 0x3FF	-
5 [1]	D/41ESC	0xD0000 - 0xD1FFF	-	-
	D/160SC-LS	0xD0000 - 0xD7FFF	-	-
	D/240SC-T1	0xD0000 - 0xD7FFF	-	-
	D/320SC	0xD0000 - 0xD7FFF	-	-
6	Floppy Device	-	0x3F2 - 0x3F7	2
7	Parallel Port/Dongle	-	0X378 - 0X37F	-
8	Clock/Calendar	-	0x070 - 0x07F	-
9	Antares 2000/50	-	0x210 - 0x217	-
10	Madge Token Ring (LAN)	-	0x1A20 - 0x1A2F	6
11	SCSI Controller (PCI)	0xCC000 - 0xCFFFF	0x6000 - 0x60FF	-
	VGA Controller	0xA0000 - 0xCBFFF	-	-
	3COM Ethernet (LAN)	-	0x6400 - 0x641F	-
12	Keyboard Mouse	-	0x060 - 0x064	-
13	FPU (Floating Point Unit)	-	-	-
14 [2]	Available	-	-	-
15	Aculab E1 (Rev 5)	0xE0000 - 0xE3FFF [3]	0x320 - 0x323	-
-	GammaFax	-	0x358 [4]	-
-	640 K System RAM	0x00000 - 0x9FFFF	-	-
-	Mono Video Buffer	0xB0000 - 0xB7FFF	-	-
-	BIOS and Basics	0xF0000 - 0xFFFFF	-	-
-	Extended RAM	0x100000 - 0xFDFFFF	-	-

1. Cards using the same IRQ and appearing in a shaded row are mutually exclusive
2. IDE controller must be disabled
3. ROM BIOS shadowing must be disabled for this memory range if this card is installed.
4. Refer to Channel Addresses Table for detailed I/O address information.

AP (700tp) configuration values

Video configuration values

Table 5-66: 14” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 14 inch	800x600	256	70 Hz

Table 5-67: 17” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 17 inch	1024x768	256	70 Hz

Table 5-68: 21” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 21 inch	1280x1024	256	70 Hz

COM 1 configuration values

Table 5-69: AP (700tp) COM 1

Device Description	Used for	Device name	Speed	Line-mode Label	Login/Answer	Receive Buffer
IBM-COM1[a]	Modem	tty1A	115200	q	enabled	4

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

COM 2 configuration values

Table 5-70: AP (700tp) COM 2

Device Description	Used for	Device name	Speed	Line-mode Label	Login/Answer	Receive Buffer
IBM-COM2[a]	UPS	tty2a	9600	m	disabled	14

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

Parallel port configuration values

Table 5-71: AP (700tp) Parallel port

Device description	Device name	I/O address	IRQ
Parallel adapter[a]	/dev/lp0	378-37F	7

a. Only network printers are supported.

Mouse port configuration values

Table 5-72: AP (700tp) Mouse port

Device description	Device name	Associations
High resolution keyboard mouse	/dev/mouse/kb0	tty01, tty02, tty03, tty04, tty05, tty06, tty07, tty08, tty09, tty10, tty11, tty12, console

Ethernet LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-73: AP (700tp) Ethernet LAN card

Device name	PCI bus	Device number	Function	Protocol
3COM EtherLink XL PCI (3C900)	0	18	0	SCO TCP/IP

Token Ring LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-74: AP (700tp) Token Ring LAN card

Device name	I/O location	Transfer mode	Protocol
Madge Smart AT Plus adapter	1a20	DMA	SCO TCP/IP

System memory configurations

Only the following DRAM configurations are supported:

Table 5-75: Supported DRAM configurations

Bank 0 (SIMM 1, 2)	Bank 1 (SIMM 3, 4)	Total Memory
32 Mbytes	Empty	64 Mbytes (standard)
32 Mbytes	32 Mbytes	128 Mbytes

SCSI ID configuration values

Note: The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-76: AP (700tp) SCSI ID configuration[1]

SCSI ID[a]	Device	Comments
0	First disk	Terminated
1	Second disk	Must set jumper settings on the drive
2	DAT tape drive	Not terminated (Narrow SCSI distribution)
5	CDROM drive	Not terminated (Narrow SCSI distribution)
7	SCSI controller	PCI Adaptec controller

a. The incorrect setting of SCSI IDs and/or the insertion of disk drives into incorrect drive bays can cause data loss and corruption on systems utilizing disk mirroring.

1. The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-77: AP (700tp) memory, I/O, DMA, and IRQ map

IRQ	Device type	Shared memory address range	I/O address	DMA channel
0	Internal timer	-	-	-
1	Keyboard buffer	-	-	-
2	Same as IRQ 9	-	-	-
3	COM 2 (UPS)	-	0x2F8 - 0x2FF	-
4	COM 1 (Modem)	-	0x3F8 - 0x3FF	-
5	Available	-	-	-
6	Floppy device	-	0x3F2 - 0x3F7	2
7	Parallel port/Dongle	-	0X378 - 0X37F	-
8	Clock/Calendar	-	0x070 - 0x07F	-
9	Available	-	-	-
10	Madge Token Ring (LAN)	-	0x1A20 - 0x1A2F	6
11	SCSI controller (PCI)	0xCC000 - 0xCFFFF	0x6000 - 0x60FF	-
	VGA controller	0xA0000 - 0xCBFFF	-	-
	3COM Ethernet (LAN)	-	0x6400 - 0x641F	-
	3COM Ethernet (CCIP) [4]	-	0x6100 - 0x611F	-
12	Keyboard mouse	-	0x060 - 0x064	-
13	FPU (Floating Point Unit)	-	-	-
14 [3]	Available	-	-	-
15 [1]	Madge Token Ring (Host) [2]	-	0x3A20 - 0x3A2F	5
	Sync 570 SDLC [2]	0xDC000 - 0xDFFFF	0x310 - 0x31F	-
-	Digi PC/Xem VT-100 [2]	0xD8000 - 0xDFFFF	0x304	-
-	640 K system RAM	0x00000 - 0x9FFFF	-	-
-	Mono video buffer	0xB0000 - 0xB7FFF	-	-
-	BIOS and basics	0xF0000 - 0xFFFFF	-	-
-	Extended RAM	0x100000 - 0xFDFFFF	-	-

1. Cards using the same IRQ and appearing in a shaded row are mutually exclusive
2. Only one host card is supported
3. IDE controller must be disabled
4. A second Ethernet card for CCIP is optional, but not required.

MRS/AP (700tp) configuration values

Video configuration values

Table 5-78: 14” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 14 inch	800x600	256	70 Hz

Table 5-79: 17” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 17 inch	1024x768	256	70 Hz

Table 5-80: 21” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 21 inch	1280x1024	256	70 Hz

COM 1 configuration values

Table 5-81: MRS/AP (700tp) COM 1

Device Description	Used for	Device name	Speed	Line-mode Label	Login/Answer	Receive Buffer
IBM-COM1[a]	Modem	tty1A	115200	q	enabled	4

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

COM 2 configuration values

Table 5-82: MRS/AP (700tp)COM 2

Device Description	Used for	Device name	Speed	Line-mode Label	Login/Answer	Receive Buffer
IBM-COM2[a]	UPS	tty2a	9600	m	disabled	14

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

Parallel port configuration values

Table 5-83: MRS/AP (700tp) parallel port

Device description	Device name	I/O address	IRQ
Parallel adapter[a]	/dev/lp0	378-37F	7

a. Only network printers are supported.

Mouse port configuration values

Table 5-84: MRS/AP (700tp) mouse port

Device description	Device name	Associations
High resolution keyboard mouse	/dev/mouse/kb0	tty01, tty02, tty03, tty04, tty05, tty06, tty07, tty08, tty09, tty10, tty11, tty12, console

Ethernet LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-85: MRS/AP (700tp) Ethernet LAN card

Device name	PCI bus	Device number	Function	Protocol
3COM EtherLink XL PCI (3C900)	0	18	0	SCO TCP/IP

Token Ring LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-86: MRS/AP (700tp) Token Ring LAN card

Device name	I/O location	Transfer mode	Protocol
Madge Smart AT Plus adapter	1a20	DMA	SCO TCP/IP

System memory configurations

Only the following DRAM configurations are supported:

Table 5-87: Supported DRAM configurations

Bank 0 (SIMM 1, 2)	Bank 1 (SIMM 3, 4)	Total Memory
32 Mbytes	Empty	64 Mbytes (standard)
32 Mbytes	32 Mbytes	128 Mbytes

SCSI ID configuration values

Note: The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-88: MRS/AP (700tp) SCSI ID configuration[1]

SCSI ID[a]	Device	Comments
0	First disk	Terminated
1	Second disk	Must set jumper settings on the drive
2	DAT tape drive	Not terminated (Narrow SCSI distribution)
5	CDROM drive	Not terminated (Narrow SCSI distribution)
7	SCSI controller	PCI Adaptec controller

a. The incorrect setting of SCSI Ids and/or the insertion of disk drives into incorrect drive bays can cause data loss and corruption on systems utilizing disk mirroring.

1. The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-89: MRS/AP (700tp) memory, I/O, DMA, and IRQ map

IRQ	Device type	Shared memory address range	I/O address	DMA channel
0	Internal timer	-	-	-
1	Keyboard Buffer	-	-	-
2	Same as IRQ 9	-	-	-
3	COM 2 (UPS)	-	0x2F8 - 0x2FF	-
4	COM 1 (Modem)	-	0x3F8 - 0x3FF	-
5 [1]	D/41ESC	0xD0000 - 0xD1FFF	-	-
	D/160SC-LS	0xD0000 - 0xD7FFF	-	-
	D/240SC-T1	0xD0000 - 0xD7FFF	-	-
	D/320SC	0xD0000 - 0xD7FFF	-	-
6	Floppy device	-	0x3F2 - 0x3F7	2
7	Parallel port/Dongle	-	0X378 - 0X37F	-
8	Clock/Calendar	-	0x070 - 0x07F	-
9	Antares 2000/50	-	0x210 - 0x217	-
10	Madge Token Ring (LAN)	-	0x1A20 - 0x1A2F	6
11	SCSI controller (PCI)	0xCC000 - 0xCFFFF	0x6000 - 0x60FF	-
	VGA controller	0xA0000 - 0xCBFFF	-	-
	3COM Ethernet (LAN)	-	0x6400 - 0x641F	-
	3COM Ethernet (CCIP) [6]	-	0x6100 - 0x611F	-
12	Keyboard mouse	-	0x060 - 0x064	-
13	FPU (Floating Point Unit)	-	-	-
14 [3]	Aculab E1 (Rev 5)	0xE0000 - 0xE3FFF [4]	0x320 - 0x323	-
15 [1]	Madge Token Ring (Host) [2]	-	0x3A20 - 0x3A2F	5
	Sync 570 SDLC [2]	0xDC000 - 0xDFFFF	0x310 - 0x31F	-
-	GammaFax	-	0x358 [5]	-
-	Digi PC/Xem VT-100 [2]	0xD8000 - 0xDFFFF	0x304	-
-	640 K system RAM	0x00000 - 0x9FFFF	-	-
-	Mono video buffer	0xB0000 - 0xB7FFF	-	-
-	BIOS and basics	0xF0000 - 0xFFFFF	-	-
-	Extended RAM	0x100000 - 0xFDFFFF	-	-

1. Cards using the same IRQ and appearing in a shaded row are mutually exclusive
2. Only one host card is supported
3. IDE controller must be disabled
4. ROM BIOS shadow ing must be disabled for this memory range if this card is installed.
5. Refer to Channel Addresses Table for detailed I/O address information.
6. A second Ethernet card for CCIP is optional, but not required.

MRS/Rack (1000rp) configuration values

Video configuration values

Table 5-90: 14” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 14 inch	800x600	256	70 Hz

Table 5-91: 17” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 17 inch	1024x768	256	70 Hz

Table 5-92: 21” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 21 inch	1280x1024	256	70 Hz

COM 1 configuration values

Table 5-93: MRS/Rack COM 1

Device Description	Used for	Device name	Speed	Line-mode Label	Login/Answer	Receive Buffer
IBM-COM1[a]	Modem	tty1A	115200	q	enabled	4

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

COM 2 configuration values

Table 5-94: MRS/Rack COM 2

Device Description	Used for	Device name	Speed	Line-mode Label	Login/Answer	Receive Buffer
IBM-COM2[a]	UPS	tty2a	9600	m	disabled	14

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

Parallel port configuration values

Table 5-95: MRS/Rack parallel port

Device description	Device name	I/O address	IRQ
Parallel adapter[a]	/dev/lp0	378-37F	7

a. Only network printers are supported.

Mouse port configuration values

Table 5-96: MRS/Rack mouse port

Device description	Device name	Associations
High resolution keyboard mouse	/dev/mouse/kb0	tty01, tty02, tty03, tty04, tty05, tty06, tty07, tty08, tty09, tty10, tty11, tty12, console

Ethernet LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-97: MRS/Rack Ethernet LAN card

Device name	PCI bus	Device number	Function	Protocol
3COM EtherLink XL PCI (3C900)	0	18	0	SCO TCP/IP

Token Ring LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-98: MRS/Rack Token Ring LAN card

Device name	I/O location	Transfer mode	Protocol
Madge Smart AT Plus adapter	1a20	DMA	SCO TCP/IP

System memory configurations

Only the following DRAM configurations are supported:

Table 5-99: Supported DRAM configurations

Bank 0 (SIMM 1, 2)	Bank 1 (SIMM 3, 4)	Total Memory
32 Mbytes	Empty	64 Mbytes (standard)
32 Mbytes	32 Mbytes	128 Mbytes

SCSI ID configuration values

Note 1: SCSI termination is not required for any devices on the MRS/Rack.

Note 2: The 3.5" floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-100: MRS/Rack SCSI ID configuration

SCSI ID[a]	Device	Comments
0	First disk	Should always be located in left drive bay (Wide-SCSI distribution)
1	Second disk	Should always be located in the second from the left drive bay (Wide-SCSI distribution)
2	DAT tape drive (optional)	Not terminated (Narrow SCSI distribution)
5	CDROM drive (optional)	Not terminated (Narrow SCSI distribution)
7	SCSI controller	PCI Adaptec controller

a. The incorrect setting of SCSI IDs and/or the insertion of disk drives into incorrect drive bays can cause data loss and corruption on systems utilizing disk mirroring.

MRS/Rack memory, I/O, DMA, and IRQ map

Table 5-101: MRS/Rack memory, I/O, DMA, and IRQ map

IRQ	Device type	Shared memory address range	I/O address	DMA channel
0	Internal timer	-	-	-
1	Keyboard buffer	-	-	-
2	Same as IRQ 9	-	-	-
3	COM 2 (UPS)	-	0x2F8 - 0x2FF	-
4	COM 1 (Modem)	-	0x3F8 - 0x3FF	-
5 [1]	D/41ESC	0xD0000 - 0xD1FFF	-	-
	D/160SC-LS	0xD0000 - 0xD7FFF	-	-
	D/240SC-T1	0xD0000 - 0xD7FFF	-	-
	D/320SC	0xD0000 - 0xD7FFF	-	-
6	Floppy device	-	0x3F2 - 0x3F7	2
7	Parallel port/Dongle	-	0X378 - 0X37F	-
8	Clock/Calendar	-	0x070 - 0x07F	-
9	Antares 2000/50	-	0x210 - 0x217	-
10	Madge Token Ring (LAN)	-	0x1A20 - 0x1A2F	6
11	SCSI controller (PCI)	0xCC000 - 0xCFFFF	0x6000 - 0x60FF	-
	VGA controller	0xA0000 - 0xCBFFF	-	-
	3COM Ethernet (LAN)	-	0x6400 - 0x641F	-
12	Keyboard mouse	-	0x060 - 0x064	-
13	FPU (Floating Point Unit)	-	-	-
14 [2]	Available	-	-	-
15	Aculab E1 (Rev 5)	0xE0000 - 0xE3FFF [3]	0x320 - 0x323	-
-	GammaFax	-	0x358 [4]	-
-	640 K system RAM	0x00000 - 0x9FFFF	-	-
-	Mono video buffer	0xB0000 - 0xB7FFF	-	-
-	BIOS and basics	0xF0000 - 0xFFFFF	-	-
-	Extended RAM	0x100000 - 0xFDFFFF	-	-

1. Cards using the same IRQ and appearing in a shaded row are mutually exclusive
2. IDE controller must be disabled
3. ROM BIOS shadowing must be disabled for this memory range if this card is installed.
4. Refer to Channel Addresses Table for detailed I/O address information.

Rack AP (1000rp) configuration values

Video configuration values

Table 5-102: 14” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 14 inch	800x600	256	70 Hz

Table 5-103: 17” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 17 inch	1024x768	256	70 Hz

Table 5-104: 21” Monitor

Video adapter	Monitor	Resolution	Colours	Refresh rate
Cirrus Logic GD5446 PCI	Other 21 inch	1280x1024	256	70 Hz

COM 1 configuration values

Table 5-105: Rack AP COM 1

Device Description	Used for	Device name	Speed	Line-mode Label	Login/Answer	Receive Buffer
IBM-COM1[a]	Modem	tty1A	115200	q	enabled	4

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

COM 2 configuration values

Table 5-106: Rack AP COM 2

Device Description	Used for	Device name	Speed	Line-mode Label	Login/Answer	Receive Buffer
IBM-COM2[a]	UPS	tty2a	9600	m	disabled	14

a. The COMM port uses the default SCO 5.0.4p port setting of 8N1.

Parallel port configuration values

Table 5-107: Rack AP parallel port

Device description	Device name	I/O address	IRQ
Parallel adapter[a]	/dev/lp0	378-37F	7

a. Only network printers are supported.

Mouse port configuration values

Table 5-108: Rack AP mouse port

Device description	Device name	Associations
High resolution keyboard mouse	/dev/mouse/kb0	tty01, tty02, tty03, tty04, tty05, tty06, tty07, tty08, tty09, tty10, tty11, tty12, console

Ethernet LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-109: Rack AP Ethernet LAN card

Device name	PCI bus	Device number	Function	Protocol
3COM EtherLink XL PCI (3C900)	0	18	0	SCO TCP/IP

Token Ring LAN card configuration values

Note: Refer to the platform specific memory, I/O, DMA, and IRQ map.

Table 5-110: Rack AP Token Ring LAN card

Device name	I/O location	Transfer mode	Protocol
Madge Smart AT Plus adapter	1a20	DMA	SCO TCP/IP

System memory configurations

Only the following DRAM configurations are supported:

Table 5-111: Supported DRAM configurations

Bank 0 (SIMM 1, 2)	Bank 1 (SIMM 3, 4)	Total Memory
32 Mbytes	Empty	64 Mbytes (standard)
32 Mbytes	32 Mbytes	128 Mbytes

SCSI ID configuration values

Note 1: SCSI termination is not required for any devices on the Rack AP.

Note 2: The 3.5” floppy disk drive utilizes an IDE interface and does not require a SCSI ID.

Table 5-112: Rack AP SCSI ID configuration

SCSI ID[a]	Device	Comments
0	First disk	Should always be located in left drive bay (Wide-SCSI distribution)
1	Second disk	Should always be located in the second from the left drive bay (Wide-SCSI distribution)
5	CDROM drive (optional)	Not terminated (Narrow SCSI distribution)
7	SCSI controller	PCI Adaptec controller

a. The incorrect setting of SCSI IDs and/or the insertion of disk drives into incorrect drive bays can cause data loss and corruption on systems utilizing disk mirroring.

Rack AP memory, I/O, DMA, and IRQ map

Table 5-113: Rack AP memory, I/O, DMA, and IRQ map

IRQ	Device type	Shared memory address range	I/O address	DMA channel
0	Internal timer	-	-	-
1	Keyboard buffer	-	-	-
2	Same as IRQ 9	-	-	-
3	COM 2 (UPS)	-	0x2F8 - 0x2FF	-
4	COM 1 (Modem)	-	0x3F8 - 0x3FF	-
5	Available	-	-	-
6	Floppy device	-	0x3F2 - 0x3F7	2
7	Parallel port/Dongle	-	0X378 - 0X37F	-
8	Clock/Calendar	-	0x070 - 0x07F	-
9	Available	-	-	-
10	Madge Token Ring (LAN)	-	0x1A20 - 0x1A2F	6
11	SCSI controller (PCI)	0xCC000 - 0xCFFFF	0x6000 - 0x60FF	-
	VGA controller	0xA0000 - 0xCBFFF	-	-
	3COM Ethernet (LAN)	-	0x6400 - 0x641F	-
	3COM Ethernet (CCIP) [4]	-	0x6100 - 0x611F	-
12	Keyboard mouse	-	0x060 - 0x064	-
13	FPU (Floating Point Unit)	-	-	-
14 [3]	Available	-	-	-
15 [1]	Madge Token Ring (Host) [2]	-	0x3A20 - 0x3A2F	5
	Sync 570 SDLC [2]	0xDC000 - 0xDFFFF	0x310 - 0x31F	-
-	Digi PC/Xem VT-100 [2]	0xD8000 - 0xDFFFF	0x304	-
-	640 K system RAM	0x00000 - 0x9FFFF	-	-
-	Mono video buffer	0xB0000 - 0xB7FFF	-	-
-	BIOS and basics	0xF0000 - 0xFFFFF	-	-
-	Extended RAM	0x100000 - 0xFDFFFF	-	-

1. Cards using the same IRQ and appearing in a shaded row are mutually exclusive
2. Only one host card is supported
3. IDE controller must be disabled
4. A second Ethernet card for CCIP is optional, but not required.

Channel addresses

Table 5-114: Channel Addresses

Device type	Shared memory address	I/O address
Aculab E1 (Rev 4) ch 00-29	0xE0000-0xEFFFF	0x320-0x323
Aculab E1 (Rev 4) ch 00-59	0xE0000-0xEFFFF	0x320-0x323
Aculab E1 (Rev 5) ch 00-29	0xE0000-0xE3FFF	0x320-0x323
Aculab E1 (Rev 5) ch 30-59	0xE0000-0xE3FFF	0x324-0x327
Aculab E1 (Rev 5) ch 60-89[a]	0xE0000-0xE3FFF	0x324-0x327
Aculab E1 (Rev 5) ch 00-59	0xE0000-0xE3FFF	0x320-0x323
Aculab E1 (Rev 5) ch 60-119	0xE0000-0xE3FFF	0x324-0x327
Dialogic D/240SC-T1 ch 00-23	0xD0000-0xD7FFF	
Dialogic D/240SC-T1 ch 24-47	0xD0000-0xD7FFF	
Dialogic D/240SC-T1 ch 48-71	0xD0000-0xD7FFF	
Dialogic D/240SC-T1 ch 72-95	0xD0000-0xD7FFF	
Dialogic D/240SC-T1 ch 96-119	0xD0000-0xD7FFF	
Dialogic D/121B ch 00-11	0xD0000-0xD5FFF	0x340-0x343
Dialogic D/121B ch 12-23	0xD0000-0xD5FFF	0x344-0x347
Dialogic D/121B ch 24-35	0xD0000-0xD5FFF	0x348-0x34B
Dialogic D/121B ch 36-47	0xD0000-0xD5FFF	0x34C-0x34F
Dialogic LSI/120 ch 00-11	-	-
Dialogic LSI/120 ch 12-23	-	-
Dialogic LSI/120 ch 24-35	-	-
Dialogic LSI/120 ch 36-47	-	-
Dialogic D/160SC-LS ch 00-15	0xD0000-0xD7FFF	-
Dialogic D/160SC-LS ch 16-31	0xD0000-0xD7FFF	-

Device type	Shared memory address	I/O address
Dialogic D/160SC-LS ch 32-47	0xD0000-0xD7FFF	-
Dialogic D/160SC-LS ch 48-63	0xD0000-0xD7FFF	-
Dialogic D/160SC-LS ch 64-79	0xD0000-0xD7FFF	-
Dialogic D/160SC-LS ch 80-95	0xD0000-0xD7FFF	-
Dialogic D/160SC-LS ch 96-111	0xD0000-0xD7FFF	-
Dialogic D/160SC-LS ch 112-127	0xD0000-0xD7FFF	-
Dialogic D/81A ch 00-07	0xD0000-0xD3FFF	0x340-0x343
Dialogic D/81A ch 08-15	0xD0000-0xD3FFF	0x344-0x347
Dialogic D/81A ch 16-23	0xD0000-0xD3FFF	0x348-0x34B
Dialogic D/81A ch 24-31	0xD0000-0xD3FFF	0x34C-0x34F
Dialogic D/81A ch 32-39	0xD0000-0xD3FFF	0x350-0x353
Dialogic D/81A ch 40-47	0xD0000-0xD3FFF	0x354-0x357
Dialogic LSI/80 ch 00-07	-	-
Dialogic LSI/80 ch 08-15	-	-
Dialogic LSI/80 ch 16-23	-	-
Dialogic LSI/80 ch 24-31	-	-
Dialogic LSI/80 ch 32-39	-	-
Dialogic LSI/80 ch 40-47	-	-
Dialogic D/320SC ch 00-29	0xD0000-0xD7FFF	-
Dialogic D/320SC ch 30-59	0xD0000-0xD7FFF	-
Dialogic D/320SC ch 60-89	0xD0000-0xD7FFF	-
Dialogic D/320SC ch 90-119	0xD0000-0xD7FFF	-
Dialogic D/41ESC (4 port) ch 00-03	0xD0000-0xD1FFF	-
Dialogic D/41ESC (4 port) ch 04-07	0xD0000-0xD1FFF	-

Device type	Shared memory address	I/O address
Dialogic D/41ESC (4 port) ch 08-11	0xD0000-0xD1FFF	-
Dialogic D/41ESC (4 port) ch 12-15	0xD0000-0xD1FFF	-
Dialogic D/41ESC (4 port) ch 16-19	0xD0000-0xD1FFF	-
Dialogic D/41ESC (4 port) ch 20-23	0xD0000-0xD1FFF	-
Dialogic D/41ESC (4 port) ch 24-27	0xD0000-0xD1FFF	-
Dialogic D/41ESC (4 port) ch 28-31	0xD0000-0xD1FFF	-
Dialogic D/41ESC (4 port) ch 32-35	0xD0000-0xD1FFF	-
Dialogic D/41ESC (4 port) ch 36-39	0xD0000-0xD1FFF	-
Dialogic D/41ESC (4 port) ch 40-43	0xD0000-0xD1FFF	-
Dialogic D/41ESC (4 port) ch 44-47	0xD0000-0xD1FFF	-
VCS VR160 card #1	0xD8000-0xD9FFF	0x200-0x203
VCS VR160 card #2	0xDA000-0xDBFFF	0x204-0x207
Antares TTS card 1	-	0x210-0x217
Antares TTS card 2	-	0x218-0x21F
Antares TTS card 3	-	0x220-0x227
Antares TTS card 4	-	0x228-0x22F
Antares TTS card 5	-	0x230-0x237
Antares TTS card 6	-	0x238-0x23F
Antares TTS card 7	-	0x240-0x247
Antares TTS card 8	-	0x248-0x24F
Brooktrout Fax TR114-I2P ch 00-01	-	0x120-0x12B
Brooktrout Fax TR114-I2P ch 02-03	-	0x148-0x153
Brooktrout Fax TR114-I2P ch 04-05	-	0x170-0x17B

Device type	Shared memory address	I/O address
Brooktrout Fax TR114-I2P ch 06-07	-	0x198-0x1A3
Brooktrout Fax TR114-I2P ch 08-09	-	0x1C0-0x1CB
Brooktrout Fax TR114-I2P ch 10-11	-	0x210-0x21B
Brooktrout Fax TR114-I4P ch 00-03	-	0x120-0x133
Brooktrout Fax TR114-I4P ch 04-07	-	0x148-0x15B
Brooktrout Fax TR114-I4P ch 08-11	-	0x170-0x183
Brooktrout Fax TR114-I4P ch 12-15	-	0x198-0x1AB
Brooktrout Fax TR114-I4P ch 16-19	-	0x1C0-0x1D3
Brooktrout Fax TR114-I4P ch 20-23	-	0x210-0x223
Brooktrout Fax TR114-I8P ch 00-07	-	0x120-0x143
Brooktrout Fax TR114-I8P ch 08-15	-	0x148-0x16B
Brooktrout Fax TR114-I8P ch 16-23	-	0x170-0x193
Brooktrout Fax TR114-I8P ch 24-31	-	0x198-0x1BB
Brooktrout Fax TR114-I8P ch 32-39	-	0x1C0-0x1E3
Brooktrout Fax TR114-I8P ch 40-47	-	0x210-0x233
GammaFax CP-4/SC ch 00-03[b]	-	0x358-0x35C,0x350,0x360,0x370,0x250
GammaFax CP-4/SC ch 04-07	-	0x158-0x15C,0x260,0x270,0x150,0x160
GammaFax CP-4/SC ch 08-011	-	0x168-0x16C, 0x100,0x104,0x108,0x10C
GammaFax CP-4/SC ch 12-15	-	0x140-0x144, 0x110,0x114,0x118,0x11C
GammaFax CP-4/SC ch 16-19	-	0x2B0-0x2B4, 0x290, 0x294, 0x298, 0x29C

Device type	Shared memory address	I/O address
GammaFax CP-4/SC ch 20-23	-	0x148-0x14C, 0x280, 0x284, 0x288, 0x28C
GammaFax CP-4/SC ch 24-27	-	0x2B8-0x2BC, 0x120,0x124,0x128,0x12C
GammaFax CP-4/SC ch 28-31	-	0x2C0-0x2C4, 0x130,0x134,0x138,0x13C
GammaFax CP-6/SC ch 00-05[c]	-	0x2B8-0x2BC, 0x120, 0x124, 0x128, 0x12C
GammaFax CP-6/SC ch 06-11	-	0x158-0x15C,0x150,0x160,0x100,0x104,0x108,0x10C
GammaFax CP-6/SC ch 12-17	-	0x168-0x16C,0x110,0x114,0x118,0x11C,0x280,0x284
GammaFax CP-6/SC ch 18-23	-	0x140-0x144,0x288,0x28C,0x290,0x294,0x298,0x29C
GammaFax CP-6/SC ch 24-29	-	0x148-0x14C,0x120,0x124,0x128,0x12C,0x130,0x134
GammaFax CP-6/SC ch 30-35	-	0x2B0-0x2B4,0x138,0x13C,0x180,0x184,0x188,0x18C
GammaFax CP-6/SC ch 36-41	-	0x2B8-0x2BC,0x190,0x194,0x198,0x19C,0x1A0,0x1A4
GammaFax CP-6/SC ch 42-47	-	0x2C0-0x2C4,0x1AB,0x1AC,0x1B0,0x1B4,0x1B8,0x1BC
GammaFax CP-12/SC ch 0-11[d]	-	0x2C8-0x2cc, 0x1C0, 0x1C4, 0x1C8, 0x1cc, 0x1D0, 0x1D4, 0x1D8, 0x1DC, 0x1E0, 0x1E4, 0x1E8, 0x1EC
GammaFax CP-12/SC ch 12-23	-	0x2B8 - 0x2BC, 0x190, 0x194, 0x198, 0x19C, 0x1A0, 0x1A4, 0x1A8, 0x1AC, 0x1B0, 0x1B4, 0x1B8, 0x1BC

Device type	Shared memory address	I/O address
GammaFax CP-12/SC ch 24-35	-	0x148-0x14C, 0x120,0x124,0x128,0x12C, 0x130,0x134,0x138,0x13C, 0x180,0x184,0x188,0x18C
GammaFax CP-12/SC ch 35-47	-	0x168 - 0x16C, 0x110, 0x114, 0x118, 0x11c, 0x280, 0x284, 0x288, 0x28C, 0x290, 0x294, 0x298, 0x29C
GammaFax CP-12/SC ch 48-59	-	0x358 - 0x35C, 0x350, 0x360, 0x370, 0x250, 0x260, 0x270, 0x150, 0x160, 0x100, 0x104, 0x108, 0x10C

a. This configuration is only possible if an Aculab E1 (Rev 5) occupies channels 00-59. The first 60 ports of 90 port Aculab system must be provided by the 60 port Aculab (Rev) card.

b. The CP-4/SC I/O address cell is organized as SC200 I/O range, channel A I/O address, channel B I/O address, channel C I/O address and channel D I/O address. Fax channels use a four byte I/O address range. SC2000 I/O addresses use a five byte address range. Example: a fax channel at 350h occupies 350h-353h, and an SC2000 chip at 358h occupies 358h-35Ch.

c. The CP-6/SC I/O address cell is organized as SC200 I/O range, channel A I/O address, channel B I/O address, channel C I/O address, channel D I/O address channel E I/O address and channel F I/O address. Fax channels use a four byte I/O address range. SC2000 I/O addresses use a five byte address range. Example: a fax channel at 350h occupies 350h-353h, and an SC2000 chip at 358h occupies 358h-35Ch.

d. The CP-12/SC I/O address cell is organized as SC200 I/O range, channel A I/O address, channel B I/O address, channel C I/O address, channel D I/O address channel E I/O address, channel F I/O address channel G I/O address, channel H I/O address, channel I I/O address, channel J I/O address channel K I/O address and channel L I/O address. Fax channels use a four byte I/O address range. SC2000 I/O addresses use a five byte address range. Example: a fax channel at 350h occupies 350h-353h, and an SC2000 chip at 358h occupies 358h-35Ch.

GammaLink fax board combination rules

The fax boards supported on the SOIVR 4.0 hardware platforms are the GammaLink CP/4, CP/6, and CP/12, each having 4, 6, and 12 ports respectively. It is possible to combine multiple fax boards which have a dissimilar number of ports in one system; however, only certain configurations are supported in SOIVR 4.0.

The maximum number of GammaLink fax ports in a chassis is 60 ports. Table 5-115 below shows that the maximum number of fax ports in a chassis could be less than 60 ports when combining CP/4 and CP12 GammaLink fax boards. This limitation has been imposed by I/O address conflicts for higher GammaLink fax port capacities.

The rules for combining GammaLink fax boards are:

- Mixing CP/4, CP/6 in one system[1] is NOT supported.
- A maximum of 8 CP/4 boards ONLY in one system IS supported.
- A maximum of 8 CP/6 boards ONLY in one system IS supported.
- A maximum of 5 CP/12 boards ONLY in one system IS supported.

Refer to Table 5-115, “Supported combinations of GammaLink CP/4 and CP/12,” on page 5-52 and Table 5-116, “Supported combinations of GammaLink CP/6 and CP/12,” on page 5-52 for a list of all possible combinations when mixing GammaLink boards of different types in one system. The maximum number of ports for supported configurations are indicated. For completeness, the tables also include the configurations where multiple boards with the same number of ports are supported

1. The term “system” refers to one of the SOIVR 4.0 platforms: a single 300tp, 700tp or 1000rp.

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Table 5-115: Supported combinations of GammaLink CP/4 and CP/12

# of CP/12	# of CP/4								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	0	4	8	12	16	20	24	28	32
1	12	16	20	24	28	32	36	40	44
2	24	28	32	36	40	44	48	52	-
3	36	40	44	48	52	56	-	-	-
4	48	52	56	-	-	-	-	-	-
5	60	-	-	-	-	-	-	-	-

Table 5-116: Supported combinations of GammaLink CP/6 and CP/12

# of CP/12	# of CP/6								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	0	6	12	18	24	30	36	42	48
1	12	18	24	30	36	42	48	54	60
2	24	30	36	42	48	54	60	-	-
3	36	42	48	54	60	-	-	-	-
4	48	54	60	-	-	-	-	-	-
5	60	-	-	-	-	-	-	-	-

Hard disk types

Symposium OPEN IVR 4.0 supports all 1-Gbyte disk types in the legacy R2 MRS/Tower and R2 MRS/Rack, as well as the newer 4.5-Gbyte disk types on all other platforms. The disks and key parameters are listed in the following table.

Table 5-117: Supported hard disks

Model	SCSI	Cyl	Hds	Trks	SPT	Storage Kbytes	Platforms
ST31051N	Narrow	1010	64	64640	32	1034240	R2 MRS Tower/Rack
ST31230N	Narrow	1010	64	64640	32	1034240	R2 MRS Tower/Rack
ST34573W	Wide	553	255	141015	63	4441973	Tower AP, MRS/Tower
ST34573WC	Wide	553	255	141015	63	4441973	R2 AP, Rack AP

The SCSI type for supported disks is either “narrow”, which is connected using a 50-connector cable, or “wide” which is connected using a 68-connector cable. The “wide” cable uses thinner connectors and so the “narrow” connector is actually wider in appearance.

The product of cylinders and heads is the track count. Each track holds a fixed number of sectors, which is the Sector Per Track (SPT) value. This SPT value is either 32 or 63. Each sector holds 512 bytes in any case, which is exactly half a standard 1024 byte block. The total number of sectors is the product of the number of tracks and the SPT value. The total disk storage is the product of the number of bytes per sector and the total number of sectors.

Hard disk partitioning

Note: See "Hard disk types" on page 5-53 for supported hard disk information.

1-Gbyte hard disk partitioning

Table 5-118: 1-Gbyte hard disk partitioning

Partition	Type	Tracks	SPT	Sectors	1K blocks
1 - *active*	UNIX	63189	32	2022048	1011024
2 - *inactive*	DOS-32	1008	32	32256	16128

1-Gbyte UNIX Partition 1 divisions

Table 5-119: 1-Gbyte UNIX Partition 1 divisions

Division	Name	1K blocks	Start	End
0	boot	10000	0	9999
1	swap	32999	10000	42999
2	root	257000	43000	299999
3	u	700000	300000	999999
6	recover	10	1003000	1003009
7	hd0a	1011024	0	1011023

1-Gbyte UNIX Partition 2 divisions

Partition 2 is a DOS partition and contains no divisions.

4.5-Gbyte hard disk partitioning

Table 5-120: 4.5-Gbyte hard disk partitioning

Partition	Type	Tracks	SPT	Sectors	1K blocks
1 - *active*	UNIX	140224	63	8834112	4417056
2 - *inactive*	DOS-32	512	63	32256	16128

4.5-Gbyte UNIX Partition 1 divisions

Table 5-121: 4.5-Gbyte UNIX Partition 1 divisions

Division	Name	1K blocks	Start	End
0	boot	10000	0	9999
1	swap	90000	10000	99999
2	root	600000	100000	699999
3	u	3700000	700000	4399999
6	recover	10	4400000	4400009
7	hd0a	4417055	0	4417056

4.5-Gbyte UNIX Partition 2 divisions

Partition 2 is a DOS partition and contains no divisions.

Multiple hard disk configurations

Note: The first disk of a multiple hard disk configuration contains the standard UNIX partition 1 divisions as installed by the MIT process as shown in the UNIX Partition 1 Divisions tables detailed above. Only the *u* division is displayed in the multiple hard disk configuration tables. Division *u* usage is not restricted to VSN volumes. Software and VSN volume data can have an arbitrary storage distribution in their division as long as the total storage does not exceed the division size.

Multiple 1-Gbyte disks

Table 5-122: One 1-Gbyte disk configuration

Disk	SCSI ID	Division name	Division size in 1K blocks	NFS mounted VSN volumes
First	0	u	700000	vsnA, vsnB, vsnC, vsnD

Table 5-123: Two 1-Gbyte disk configuration

Disk	SCSI ID	Division name	Division size in 1K blocks	NFS mounted VSN volumes
First	0	u	700000	vsnA
Second	1	u1	1000000	vsnB, vsnC, vsnD

Table 5-124: Three 1-Gbyte disk configuration

Disk	SCSI ID	Division name	Division size in 1K blocks	NFS mounted VSN volumes
First	0	u	700000	vsnA
Second	1	u1	1000000	vsnB
Third	3	u2	1000000	vsnC, vsnD

Table 5-125: Four 1-Gbyte disk configuration

Disk	SCSI ID	Division name	Division size in 1K blocks	NFS mounted VSN volumes
First	0	u	700000	vsnA
Second	1	u1	1000000	vsnB
Third	3	u2	1000000	vsnC
Fourth	4	u3	1000000	vsnD

Multiple 4.5-Gbyte disks

Table 5-126: One 4.5-Gbyte disk configuration

Disk	SCSI ID	Division name	Division size in 1K blocks	NFS mounted VSN volumes
First	0	u	3700000	vsnA, vsnB, vsnC, vsnD

Table 5-127: Two 4.5-Gbyte disk configuration

Disk	SCSI ID	Division name	Division size in 1K blocks	NFS mounted VSN volumes
First	0	u	3700000	vsnA, vsnB,
Second	1	u1	4400000	vsnC, vsnD

Disk mirroring configuration

The first disk of a disk mirroring configuration contains the standard UNIX partition 1 divisions as installed by the MIT process as shown in the UNIX Partition 1 Divisions tables detailed above. Only the *u* division is displayed in the disk mirroring configuration tables. All divisions are mirrored.

1-Gbyte Disks

Table 5-128: Single pair 1-Gbyte disk configuration

Disk	SCSI ID	Division name	Division size in 1K blocks	NFS mounted VSN volumes
First	0	u	700000	vsnA, vsnB, vsnC, vsnD
Second	1	u	700000	vsnA, vsnB, vsnC, vsnD

4.5-Gbyte disks

Table 5-129: Single pair 4.5-Gbyte disk configuration

Disk	SCSI ID	Division name	Division size in 1K blocks	NFS mounted VSN volumes
First	0	u	3700000	vsnA, vsnB, vsnC, vsnD
Second	1	u	3700000	vsnA, vsnB, vsnC, vsnD

Factory default network settings

LAN cards

Table 5-130: AP SCO TCP/IP configuration

Option	Value
Local host name	nt_ap1
IP address	10.10.1.10
Netmask	255.255.255.0
Broadcast address	10.10.1.255
Domain name	nt.com
TCP connections	1024
Pseudo TTYs	64

Table 5-131: MRS/AP SCO TCP/IP configuration

Option	Value
Local host name	nt_mrsap
IP address	10.10.1.20
Netmask	255.255.255.0
Broadcast address	10.10.1.255
Domain name	nt.com
TCP connections	1024
Pseudo TTYs	64

Table 5-132: MRS SCO TCP/IP configuration

Option	Value
Local host name	nt_mrs1[a]
IP address	10.10.1.1
Netmask	255.255.255.0
Broadcast address	10.10.1.255
Domain name	nt.com
TCP connections	1024
Pseudo TTYs	64

a. This value is for the first MRS. Subsequent MRSs will be named nortel_mrs2, nortel_mrs3 and nortel_mrs4. Their respective IP addresses will be 10.10.1.2, 10.10.1.3 and 10.10.1.4.

TCP/IP host communications

Default IP address: 10.10.2.1

IPML Ethernet card

Default IP address: 10.10.3.1

Factory set accounts and passwords

Table 5-133: Default accounts and passwordsVSN map

Account	Password	Comment
root	root1	superuser on MRS, AP and MRS/AP
nortel	nortel1	IVR user on AP and MRS/AP
service	service1	service account on MRS and MRS/AP
admin	admin1	site administrators on MRS, AP and MRS/AP
user	user1	routine maintenance on MRS and MRS/AP
nppp	nppp1	PPP user on MRS, AP and MRS/AP

VSN map

Table 5-134: VSN map

VSN Range	Assignment
0-399	Reserved for US English system prompts
400-499	Reserved for NTTEST application system prompts
500-999	Reserved for Canadian French or Parisian French system prompts
1000-1499	Reserved for Spanish system prompts
1500-1999	Reserved for Italian system prompts
2000-2499	Reserved for German system prompts
2500-2999	Reserved for Japanese system prompts
3000-3499	Reserved for UK English system prompts
3500-3999	Reserved for additional language system prompts use
4000-4499	Reserved for additional language system prompts use
4500-4999	Reserved for additional language system prompts use
5000-5499	Reserved for additional language system prompts use

VSN map

Table 5-134: VSN map

VSN Range	Assignment
5500-5999	Reserved for additional language system prompts use
6000-6499	Reserved for additional language system prompts use
6500-6999[a]	Recommended for US English application prompts
7000-7499	Recommended for Canadian French or Parisian French application prompts
7500-7999	Recommended for Spanish application prompts
8000-8499	Recommended for Italian application prompts
8500-8999	Recommended for German application prompts
9000-9499	Recommended for Japanese application prompts
9500-9999	Recommended for UK English application prompts
10000-10499	Recommended for additional language application prompts use
10500-10999	Recommended for additional language application prompts use
11000-11499	Recommended for additional language application prompts use
11500-11999	Recommended for additional language application prompts use
12000-12499	Recommended for additional language application prompts use
12500-12999	Recommended for additional language application prompts use
13000-	Reserved for messages

a. The VSN range 6500-12999 is reserved for local prompts. All sub ranges are recommendations for applications prompts.

BIOS settings

700t

SCU Settings

- Configuration Settings - System Board
- Power-On Speed Option: CPU Speed = FAST
- Cache Control Option: Enable - Write Back
- Shadowing at C0000: Disable
- Shadowing at C4000: Disable
- Shadowing at C8000: Disable
- Shadowing at CC000: Disable
- Shadowing at D0000: Disable
- Shadowing at D4000: Disable
- Shadowing at D8000: Disable
- Shadowing at DC000: Disable
- Shadowing at E0000: Disable
- Shadowing at E4000: Disable
- Base Memory Option: 640KB Base Memory
- Total System Memory Below 512M: XX MB(No 1M hole at 15M)
- Total System Memory Above 512M: 0 MB
- On-Board Floppy Controller Options: AUTO Enable
- Floppy Drive A Options: 3.5 inch 1.44 MB drive
- Floppy Drive B Options: Disable or not installed
- Onboard IDE Controller: Disable
- IDE Auto Configuration Drive C: Drive not detected
- Multi-sector Transfer Selection Drive C: Disable
- Translation Mode: Auto configured
- Fast Programmed I/O modes: D

- ISA IDE DMA Transfers: D
- IDE Auto Configuration Drive D: Drive not detected
- Multi-sector Transfer Selection Drive D: Disable
- Translation Mode: Auto configured
- Fast Programmed I/O modes: D
- ISA IDE DMA Transfers: D
- IDE Auto Configuration Drive E: Drive not detected
- Multi-sector Transfer Selection Drive E: Disable
- Translation Mode: Auto configured
- Fast Programmed I/O modes: D
- ISA IDE DMA Transfers: D
- IDE Auto Configuration Drive F: Drive not detected
- Multi-sector Transfer Selection Drive F: Disable
- Translation Mode: Auto configured
- Fast Programmed I/O modes: D
- ISA IDE DMA Transfers: D
- Current Language: English (US)
- Numlock Boot Option: OFF at boot
- Typematic Speed: AUTO
- Mouse Control Option: Mouse auto detected
- Serial Port 1 Address: Set serial port 1 at 3F8h - IRQ 4
- Serial Port 2 Address: Set serial port 2 at 2F8h - IRQ 3
- Parallel Port Address: Parallel port address 378h - IRQ 7
- Parallel Port Mode: Parallel port mode ISA-Compatible
- COM Port For Redirection: (Disable 0r COM 1 or COM 2)
- Serial Port Baud Rate: 115.2K Baud
- Hardware Flow Control: CTS/RTS

- Select Terminal Type: ANSI
- Administrative Password Option: Disabled
- User Password Option: Disabled
- Hot Key Option: Disabled
- Secure Boot Mode: Disabled
- Enable Video Blanking: Disabled
- Set Blockout Timer: 10
- Floppy Writes: Disabled
- Boot Sequence Control: Boot floppy A then hard drive C
- Display Message During Post: Enabled
- Require User Interaction on POST Errors: Enabled
- SCSI-A ROM BIOS Scan: Enabled
- LCD Display String Enable or Disable: Enabled
- LCD Display String Before OS Boot: Symposium Open IVR 4.0
- Speaker Option: Enabled
- Scanning User Flash Area: Disable

MRS/Tower - MRS/Rack

Standard CMOS Setup

- Date: month/day/year
- Time: hh/mm/ss
- Hard Disk C: Not installed
- Hard Disk D: Not installed
- Floppy Drive A: 1.44 MB 3.5”
- Floppy Drive B: Not installed
- Primary Display: Not installed
- Keyboard: Not installed

Advanced CMOS Setup

- Above 1MB Memory Test: Disabled
- Hit <DEL> Message Display: Enabled
- Wait for <F1> If Any Error: Enabled
- System Boot Up Numlock: On
- Numeric Processor Test: Enabled
- Floppy Drive Seek at Boot: Disabled
- System Boot Up Sequence: A:,C:
- External Cache Memory: Enabled
- Internal Cache Memory: Enabled
- Password Checking Option: Setup
- Video ROM Shadow C000, 16K: Enabled
- Video ROM Shadow C400, 16K: Enabled
- Adapter ROM Shadow C800, 16K: Disabled
- Adapter ROM Shadow CC00, 16K: Disabled
- Adapter ROM Shadow D000, 16K: Disabled
- Adapter ROM Shadow D400, 16K: Disabled
- Adapter ROM Shadow D800, 16K: Disabled
- Adapter ROM Shadow DC00, 16K: Disabled
- Adapter ROM Shadow E000, 16K: Disabled
- Adapter ROM Shadow E400, 16K: Disabled
- Adapter ROM Shadow E800, 16K: Disabled
- Adapter ROM Shadow EC00, 16K: Disabled
- System ROM Shadow F000, 64K: Enabled
- Boot Sector Virus Protection: Disabled

Advanced Chipset Setup

- Hidden Refresh: Disabled
- AT Cycle Wait State: Disabled

- AT Cycle Between I/O Cycles: 6
- AT BUS Clock Selection: CLKI/4
- NON-Cacheable Block - 1 Size: Disabled
- NON-Cacheable Block - 1 Base: 0KB
- NON-Cacheable Block - 2 Size: Disabled
- NON-Cacheable Block - 2 Base: 0KB
- Video BIOS Area Cacheable: Yes

Peripheral Management Setup

- Programming Option: AUTO
- On-Board Floppy Drive: Enabled
- On-Board IDE Drive: Disabled
- First Serial Port Address: 3F8H
- Second Serial Port Address: 2F8H
- Parallel Port Address: 378H

300tp

BIOS Version

- 11/17/98 - i430HX-2A59FN0BC-00

Standard CMOS Setup

- Date: mm:dd:yy
- Time: hh:mm:ss
- Primary Master: None
- Primary Slave: None
- Secondary Master: None
- Secondary Slave: None
- Drive A: 1.44M, 3.5 in
- Drive B: None
- Video: EGA/VGA

- Halt On: All Errors

BIOS Features Setup

- Virus Warning: Disabled
- CPU Internal Cache: Enabled
- External Cache: Enabled
- Quick Power on Self test: Enabled
- Boot Sequence: A,C
- Swap Floppy Drive: Disabled
- Boot Up Floppy Seek: Enabled
- Boot Up Numlock Status: On
- Boot Up System Speed: High
- Gate A20 Option: Fast
- Typematic Rate Setting: Disabled
- Typematic Rate (char/sec): 6
- Typematic Delay (Msec): 250
- Security Option: Setup
- PS/2 mouse function control: Enabled
- PCI/VGA Palette Snoop: Disabled
- OS Select For DRAM > 64MB: Non-OS2
- MPC Connection Options: NULL
- MPC Interface after boot: Disabled
- MPC Initial Baud Rate: 57.6K
- Video BIOS Shadow: Enabled
- C8000-CBFFF Shadow: Disabled
- CC000-CFFFF Shadow: Disabled
- D0000-D3FFF Shadow: Disabled
- D4000-D7FFF Shadow: Disabled

- D8000-DBFFF Shadow: Disabled
- DC000-DFFFF Shadow: Disabled

Chipset Features

- Auto Configuration: Enabled
- DRAM Timing: 60ns
- System BIOS Cacheable: Disabled
- VIDIO BIOS Cacheable: Disabled
- 8 Bit I/O Recovery Time: 1
- 16 Bit I/O Recovery Time: 1
- Memory Hole At 15M-16M: Disabled
- Peer Concurrency: Enabled
- Chipset Special Features: Enabled
- DRAM ECC/PARITY Select: Parity
- Memory PARITY/ECC Check: Auto
- Single Bit Error Report: Enabled
- L2 Cache Cacheable Size: 64MB
- Chipset NA# Asserted: Enabled
- Pipeline Cache Timing: Faster
- Passive Release: Enabled
- Delayed Transaction: Disabled
- WDT Configuration Port: F2h
- Watch Dog Timer: Disabled
- WDT Time Out Active For: Reset
- WDT Active Time: 64 sec

Power Management Setup

- Power Management: Disabled
- PM Controlled by APM: No

- VIDEO Off Method: Blank Screen
- MODEM Use IRQ: 4
- IRQX: IRQ settings do not matter because Power Management is disabled

PNP/PCI Configuration

- Resources Controlled by: Manual
- Reset Configuration Data: Disabled
- IRQ-3 assigned to: Legacy ISA
- IRQ-4 assigned to: Legacy ISA
- IRQ-5 assigned to: Legacy ISA
- IRQ-7 assigned to: Legacy ISA
- IRQ-9 assigned to: Legacy ISA
- IRQ-10 assigned to: Legacy ISA…
- IRQ-11 assigned to: PCI/ISA PnP
- IRQ-12 assigned to: Legacy ISA
- IRQ-14 assigned to: Legacy ISA…
- IRQ-15 assigned to: Legacy ISA
- DMA-0 assigned to: PCI/ISA PnP
- DMA-1 assigned to: PCI/ISA PnP
- DMA-3 assigned to: PCI/ISA PnP
- DMA-5 assigned to: PCI/ISA PnP
- DMA-6 assigned to: PCI/ISA PnP
- DMA-7 assigned to: PCI/ISA PnP
- PCI IRQ Activated By: Level
- PCI IDE IRQ Map to: PCI-AUTO
- Primary IDE INT#: A
- Secondary IDE INT#: B
- Used MEM Base addr: N/A

Integrated Peripherals

- IDE HDD Block Mode: Disabled
- PCI Slot IDE 2nd Channel: Disabled
- On-Chip Primary PCI IDE: Disabled
- On-Chip Secondary PCI IDE: Disabled
- USB Controller: Disabled
- Onboard FDC Controller: Enabled
- Onboard UART 1: 3F8/IRQ4
- Onboard UART 2: 2F8/IRQ3
- Onboard UART 2 Mode: Standard
- Onboard Parallel Port: 378/IRQ7
- Parallel Port Mode: Normal

700tp

Basic Options

- Time: hh:mm:ss
- Date: mm:dd:yy
- Floppy Controller: Enabled
- Drive A: $3^{1/2}$ Inch, 1.44MB
- Drive B: Not Installed
- Floppy Seek during Post: Enabled
- IDE Controller Setup: Disabled
- Auto Detect IDE Drives: Disabled
- Hard Disk 1: Not Installed
- Hard Disk 2: Not Installed
- Hard Disk 3: Not Installed
- Hard Disk 4: Not Installed
- Large Disk DOS Compatible: Disabled

- Keyboard Typematic Sound: Enabled
- Keyboard Typematic Delay: 250 msec
- Keyboard Typematic Rate: 30 chars/sec
- Shadow Ram - C000: Shadow
- Shadow Ram - C800: Shadow
- Shadow Ram - CC00: Available
- Shadow Ram - D000: Available
- Shadow Ram - D400: Available
- Shadow Ram - D800: Available
- Shadow Ram - DC00: Available
- Shadow Ram - E000: Shadow
- Shadow Ram - F000: Shadow
- 101-Key Keyboard Numlock at Boot: Enabled
- Set Boot Drive Sequence: Diskette Drive
- Report Post Errors: Enabled
- Report Option ROM Errors: Enabled
- Show F2 Message for Setup: Enabled
- Quiet Boot: Enabled
- Password Options: Disabled

Advanced Options

- Serial Port 1 Address: 03F8h IRQ 4
- Serial Port 2 Address: 02F8h IRQ 3
- Parallel Port Address: 0678h IRQ 7
- Parallel Port Mode: AT Compatible
- Serial Redirection: Disabled
- External Cache: Enabled
- Dram Speed: 60ns

- DMA Alias: Disabled
- ECC/Parity: Disabled
- Memory Gap: Disabled
- 8 Bit I/O Recovery Time: 4.5 SYSCLK
- 16 Bit I/O Recovery Time: 4.5 SYSCLK
- ISA Guaranteed Access Time: Disabled
- Delayed Transactions: Enabled
- ISA Bus Speed: 8.25 Mhz
- On Board Speaker: Enabled
- Watch Dog Timer Delay: 1.2 sec
- Allocate USB Resources: Disabled
- PS/2 Mouse: Enabled

PCI Options

- PCI IRQ Line1: IRQ11
- PCI IRQ Line2: IRQ11
- PCI IRQ Line3: IRQ11
- PCI IRQ Line4: IRQ11
- Delay for PCI Config: Disabled
- PCI Latency for Bus 0 Device 0Dh: Auto
- PCI Latency for Bus 0 Device 0Eh: Auto
- PCI Latency for Bus 0 Device 0Fh: Auto
- PCI Latency for Bus 0 Device 10h: Auto
- PCI Latency for Bus 0 Device 11h: Auto
- PCI Latency for Bus 0 Device 12h: Auto
- PCI Latency for Bus 0 Device 13h: Auto
- PCI Latency for Bus 0 Device 14h: Auto
- PCI Cache Line Size: Auto

- On Board SCSI: Enabled

1000rp

Basic Options

- Time: hh:mm:ss
- Date: mm:dd:yy
- Floppy Controller: Enabled
- Drive A: $3^{1/2}$ Inch, 1.44MB
- Drive B: Not Installed
- Floppy Seek during Post: Enabled
- IDE Controller Setup: Disabled
- Auto Detect IDE Drives: Disabled
- Hard Disk 1: Not Installed
- Hard Disk 2: Not Installed
- Hard Disk 3: Not Installed
- Hard Disk 4: Not Installed
- Large Disk DOS Comparable: Disabled
- Keyboard Typematic Sound: Enabled
- Keyboard Typematic Delay: 250 msec
- Keyboard Typematic Rate: 30 chars/sec
- Shadow Ram - C000: Shadow
- Shadow Ram - C800: Shadow
- Shadow Ram - CC00: Available
- Shadow Ram - D000: Available
- Shadow Ram - D400: Available
- Shadow Ram - D800: Available
- Shadow Ram - DC00: Available
- Shadow Ram - E000: Shadow

- Shadow Ram - F000: Shadow
- 101-Key Keyboard Numlock at Boot: Enabled
- Set Boot Drive Sequence: Diskette Drive
- Report Post Errors: Enabled
- Report Option ROM Errors: Enabled
- Show F2 Message for Setup: Enabled
- Quiet Boot: Enabled
- Password Options: Disabled

Advanced Options

- Serial Port 1 Address: 03F8h IRQ 4
- Serial Port 2 Address: 02F8h IRQ 3
- Parallel Port Address: 0678h IRQ 7
- Parallel Port Mode: AT Compatible
- Serial Redirection: Disabled
- External Cache: Enabled
- Dram Speed: 60ns
- DMA Alias: Disabled
- ECC/Parity: Disabled
- Memory Gap: Disabled
- 8 Bit I/O Recovery Time: 4.5 SYSCLK
- 16 Bit I/O Recovery Time: 4.5 SYSCLK
- ISA Guaranteed Access Time: Disabled
- Delayed Transactions: Enabled
- ISA Bus Speed: 8.25 Mhz
- On Board Speaker: Enabled
- Watch Dog Timer Delay: 1.2 sec
- Allocate USB Resources: Disabled

- PS/2 Mouse: Enabled

PCI Options

- PCI IRQ Line1: IRQ11
- PCI IRQ Line2: IRQ11
- PCI IRQ Line3: IRQ11
- PCI IRQ Line4: IRQ11
- Delay for PCI Config: Disabled
- PCI Latency for Bus 0 Device 0Dh: Auto
- PCI Latency for Bus 0 Device 0Eh: Auto
- PCI Latency for Bus 0 Device 0Fh: Auto
- PCI Latency for Bus 0 Device 10h: Auto
- PCI Latency for Bus 0 Device 11h: Auto
- PCI Latency for Bus 0 Device 12h: Auto
- PCI Latency for Bus 0 Device 13h: Auto
- PCI Latency for Bus 0 Device 14h: Auto
- PCI Cache Line Size: Auto
- On Board SCSI: Enabled

Kernel parameters defaults

Symposium OPEN IVR 4.0 factory default MRS/AP kernel parameters are listed below. For further information, refer to *SCO Performance Guide*.

- NCLIST=400
- NINODE=500
- NFILE=500
- NS5INODE=500
- FLCKREC=500
- NCALL=100
- NPROC=200

- MAXUP=60
- NREGION=700
- SHMMAX=2024000
- SHMALL=2024
- MSGTQL=1024
- MSGMAP=400
- MSGMNB=24576
- MSGSEG=16384
- MSGMNI=128
- MAXUMEM=8192
- NQUEUE=800
- NSTREAM=168
- NBLK4096=20
- NBLK2048=40
- NBLK1024=48
- NBLK512=72
- NBLK256=300
- NBLK128=450
- NBLK64=400
- NBLK16=200
- NBLK4=256
- NMUXLINK=64
- NSTRPUSH=9
- NSTREVENT=256
- SEMMSL=35

Data encoding

The following table shows A-law and μ-law support for the various telephony cards (Option cards support both A-Law and μ-Law).

Table 5-135: A-law and μ-law support

Card	Companding
D/41ESC	A-Law
LSI/120	μ-Law
LSI/80	μ-Law
D/240SC-T1	μ-Law
D/160SC-LS	μ-Law
Aculab	A-Law

Printer

Symposium OPEN IVR 4.0 only supports network printers. Printer configuration is a UNIX procedure and is independent of Symposium OPEN IVR 4.0.

Telephony bus configuration

PEB bus connectivity rules

The following are PEB connectivity rules:

- For all configurations with more than one PEB card in the system, one end of the PEB must always be connected to either a high density card(s) or a telco interface card(s).
- For low density configurations, the opposite end of the PEB must always be connected to a voice processing card(s).
- Option cards must be installed between the telco interface card(s) and the voice processing card(s) for low density configurations. For high density configurations using option card(s), an option card should terminate the PEB.

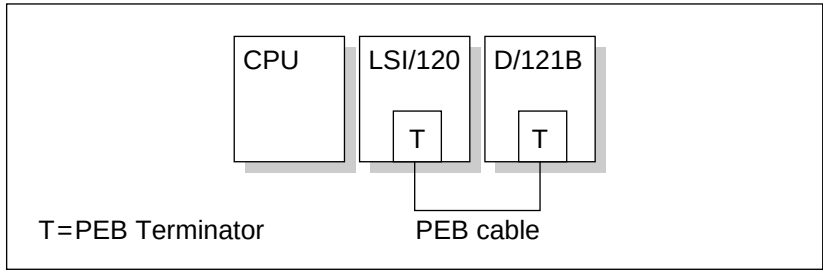
- The first and the last board on the PEB must be terminated, while other boards should not be terminated.
- In cases where a high density card is the only card in the system, such as D/240SC-T1 or D/41ESC, a PEB terminator should still be installed in the RES position on the card.
- Switch 1-1 on the fax card should be off, with the exception of the fax card furthest from the CPU (this is illustrated in the examples in the next section).
- Interrupt terminator JP7 must only be installed on the D/121B or D/81A card furthest from the CPU.
- In a high density configuration, interrupt terminator JP7 should be installed on the voice recognition card furthest from the CPU.
- If more than one LSI/120 or LSI/80 interface card is installed on the same PEB cable, only the first card (time slots 00-11 for LSI/120 or 00-07 for LSI/80) should be clock master at the end of the PEB. On that card SW1-3 must be OFF. All other LSI/120 or LSI/80 cards on the same PEB must have SW1-3 in the ON position.
- Two PEBs must be used with the 60 port E1 card. Both PEBs attach to the E1 card, and extend to the left and right side of the card. A D/320SC voice processing card should be connected on the end of each PEB. Option cards are placed between the E1 card and each D/320SC card.
- Cards on any one PEB must have a contiguous slot allocation (e.g. a card on PEB 2 must not be inserted in a slot between the first card and last card of PEB 1).

PEB connectivity examples

Note: The figures that are included in this section show the boards that must be terminated on the PEB. Terminators are identified as “T” for an external terminator that must be plugged into a socket on the module, and “t” for an internal terminator that is built into the card. The only cards that have an internal terminator are the 30- and 60-port Aculab E1 cards. As a result, they do not require external PEB terminators to be installed. The internal terminator is installed by the card manufacturer, and cannot be removed.

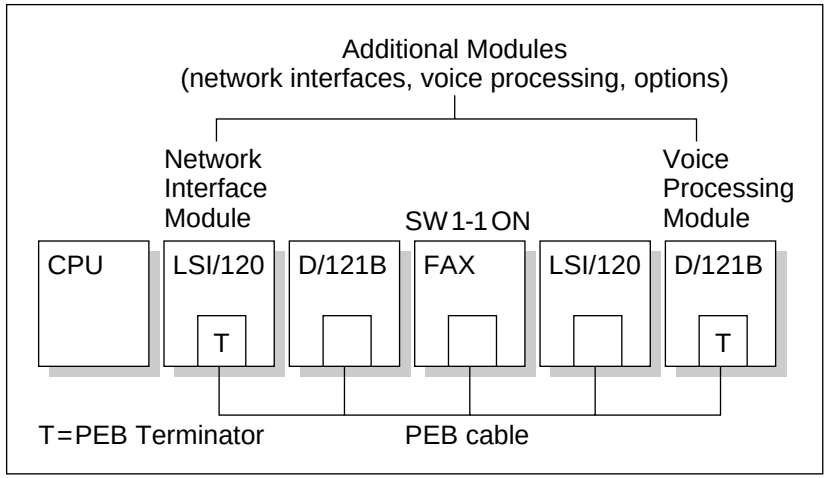
The simplest PEB configuration consists of a network interface module and voice processing module, as shown in Figure 5-6.

Figure 5-6: PEB configuration for a 12-channel loopstart interface



The PEB can support up to two 12-channel loopstart network interface modules. The option modules (for example, fax, voice recognition) whose resources are available to all channels on the PEB should be installed between the end modules, as shown in Figure 5-7 on page 5-80. The order of the option modules is not important.

Figure 5-7: Multiple modules on a PEB



The following figures provide several examples of PEB cabling rules.

Figure 5-8: PEB cabling when using the D/240SC-T1 card

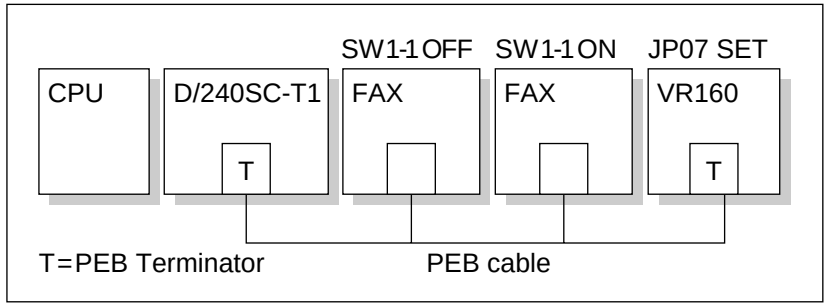


Figure 5-9: PEB cabling when using the Rev 4 30-port Aculab E1 card

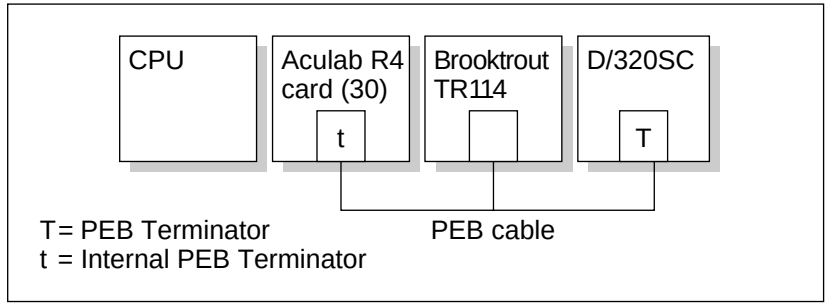


Figure 5-10: PEB cabling when using the Rev 4 60-port Aculab E1 card

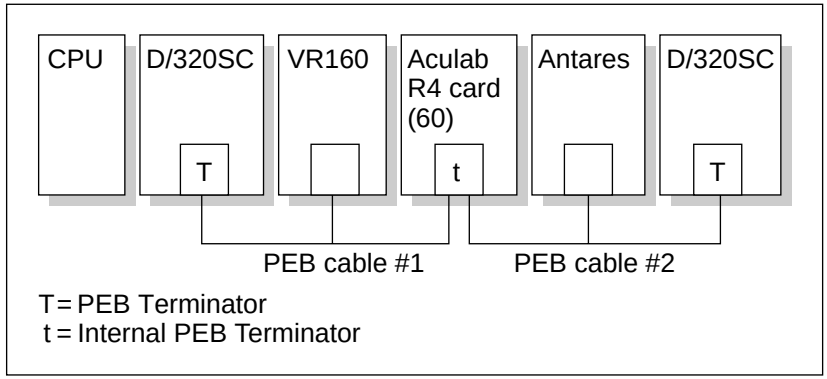


Figure 5-11: PEB cabling when using a single loopstart card

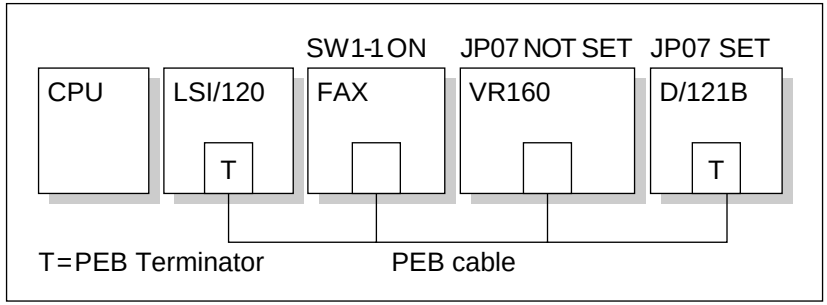


Figure 5-12: PEB cabling when using a single D/41ESC card

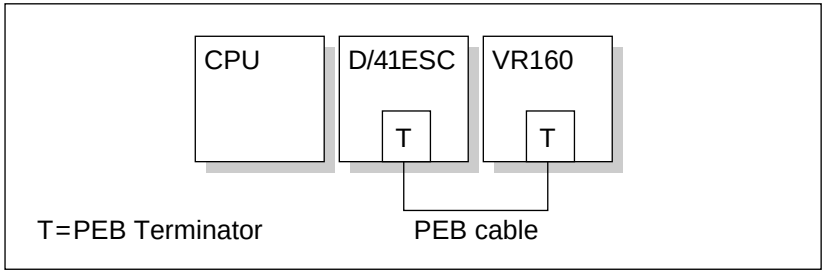
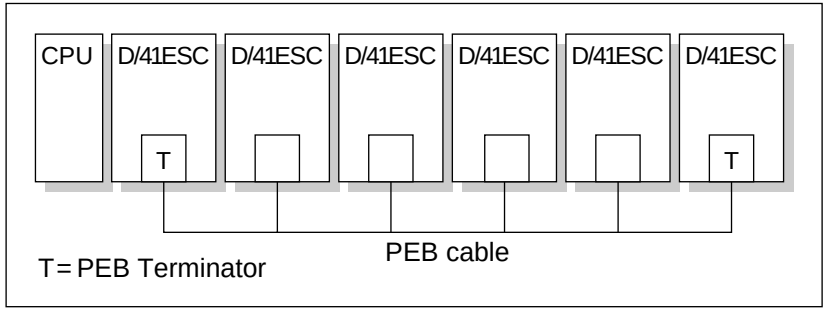


Figure 5-13: PEB cabling when using multiple D/41ESC cards



SCbus connectivity rules

Digital interfaces

In the SCI the first board should be set to slave, and all subsequent boards should be set to resource.

If there are multiple line interfaces from more than one source (CO switch and M1), the board connected to the CO switch should be configured as the first board and take priority as the timing source.

Analog interfaces

In the SCI the first board should be set to master and all subsequent boards should be set to resource

Termination

Termination is not used on SC Bus cards. Terminators must be removed from all boards

Cabling

- The SC Bus cable is identical to the PEB cable.
- Only one SC Cable must be used with the 60 port E1 card. The SC cable attaches to the E1 card, and extend to the left and right side of the card. A D/320SC voice processing card should be connected on the end of each SC cable. Option cards are placed between the E1 card and each D/320SC card.

SCbus connectivity examples

Figure 5-14: SCbus cabling when using the D/240SC-T1 card

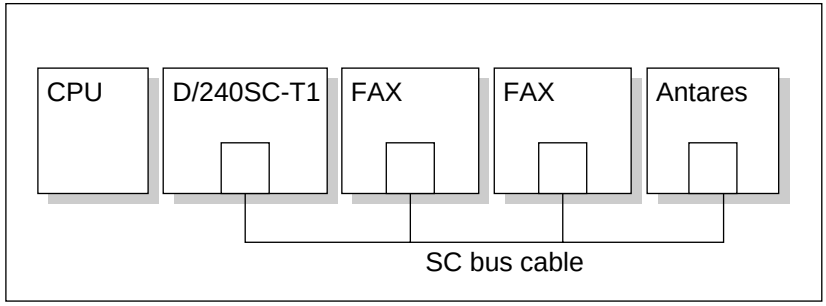


Figure 5-15: SCbus cabling when using the Rev 5 30-port Aculab E1 card

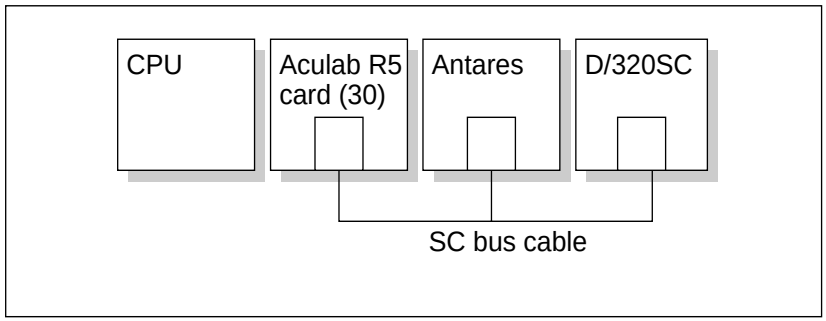


Figure 5-16: SCbus cabling when using the Rev 5 60-port Aculab E1 card

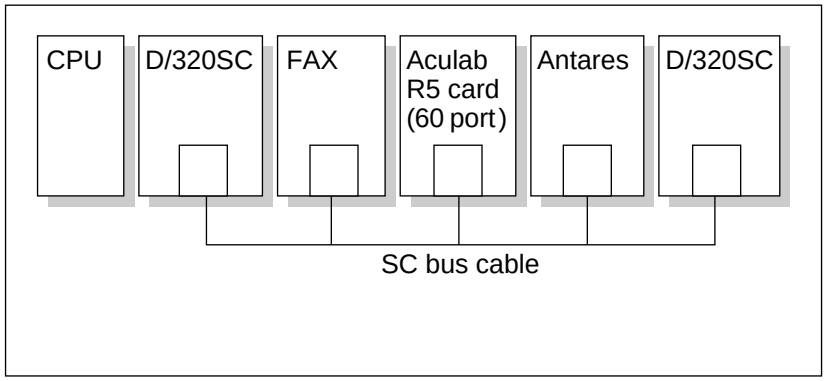
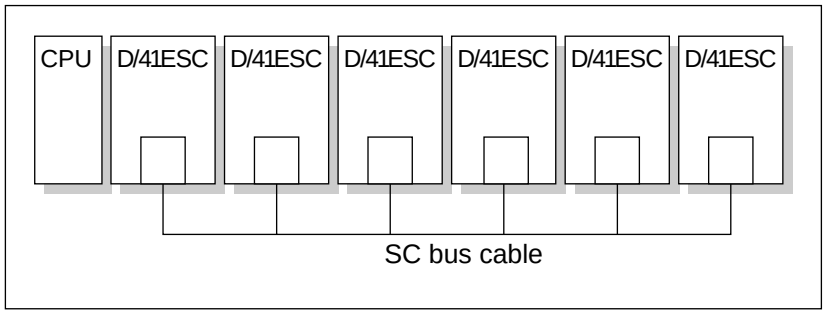


Figure 5-17: SCbus cabling when using multiple D/41ESC cards



Configuring Symposium OPEN IVR 4.0 for operation with peripherals

Host connectivity configuration

Refer to the platform specific Memory, I/O, DMA & IRQ map for board settings.

RDBMS connectivity configuration

In order for SQL to function, the SQL field must be set to ON in the AP configuration screen of the SCM. In addition, RDBMS client software must be installed on the AP according to the vendor's instructions, and must be able to connect using vendor specific connectivity tests.

AP System Configuration Management (SCM) factory defaults

Table 5-136: MRS configuration

SCM Field	Value
MRS Type	MRS/Tower
Connection Type	ETHERNET
Device Name	/dev/tty1a
Baud Rate	9600[a]
MRS Node Name	NT_MRS
Reserved Audio Paths	0
AP Control Type	PRIMARY

a. This setting is overridden by the SCO default of 115200.

Table 5-137: Node configuration

SCM Field	Value
Number of MRSs	1[a]
Maximum # of System-Wide Prompts	6500[b]
Maximum # of Local Prompts	6500
Scheduled Event Scan Rate in seconds	30
Suppress Scheduler Resource Allocation Errors	NO
SQL Support?	NO[c]
ADSI Support?	NO[d]
ASR Support?	NO[e]
Disk mirroring Support	NO[f]
Duplicate Error Log Path	/dev/null

a. Depends on customer order.
b. This is default value for North America. European prompts will default to 5000
c. Depends on customer order.
d. Depends on customer order.
e. Depends on customer order.
f. Depends on customer order.

Table 5-138: Trunk configuration

SCM Field	Value
Trunk Type	RING TRIP
Direction	INPUT
Trunk Initialization Type	LOOPSTART
# of Digits	1

WEB connectivity configuration

A virtual WEB MRS must be configured in the SCM for the AP to interface with the WEB server.

Table 5-139: Web settings

SCM Field	Value
MRS Type	MRS/WEB
Trunk Type	RING TRIP
Direction	WEB

Trunk file configuration

The following table indicates the type of trunk and its corresponding trunk type/protocol:

Table 5-140: Supported trunk types

Trunk	Trunk type/protocol	Trunk file name[a]
Loopstart	Loopstart	loopst
	Loop-B	Loopb
	LCO-Loopstart	intloopst
	ACD	m1-Xacd

Trunk	Trunk type/protocol	Trunk file name[a]
T1	T1-E&M	t1em
	T1-E&M-B	t1emb
	T1-W-ANI-E&M	t1wani
	T1-W-DNIS-E&M	t1wdnis
	T1-W-D-A-E&M	t1wda
	T1-W-E&M	t1wem
	Line side ACD (M1 only)	nt1-Xacd
	Line Side T1 non ACD	nt-fxs-t1-ls
	AT&T	attg3fxsacd
	Rolm	rolmacdlog
	DMS 100	dms100
E1	Enhanced DPNSS	e1r216d
	Mexico, China, Malaysia,	e1r2

a. Please note that uppercase letter X in the Trunk File Name denotes a variable.

Dial pulse detection

In some instances, configuring the trunk type file is required if digits are not recognized during digit cut-through. The playgain parameter in the trunk type file can be set to a negative dB value to reduce the signal level of the outgoing prompt which may be interfering with dial-pulse detection. The playgain parameter value should be set as a multiple of 3 and it is not recommended to be below -6 dB.

The impedance of the line should also be set to 600 ohms to match that of the telephony cards. A mismatch in impedances may cause problems with dial pulse detection.

IPML and Meridian Link considerations

Integrated Package for Meridian Link (IPML) release 2 is a feature of Symposium OPEN IVR 4.0. It provides a greater level of integration with the Meridian 1 PBX to allow application developers to build sophisticated Call Centre Applications.

LAN connection between IPML (AP) and Meridian Link

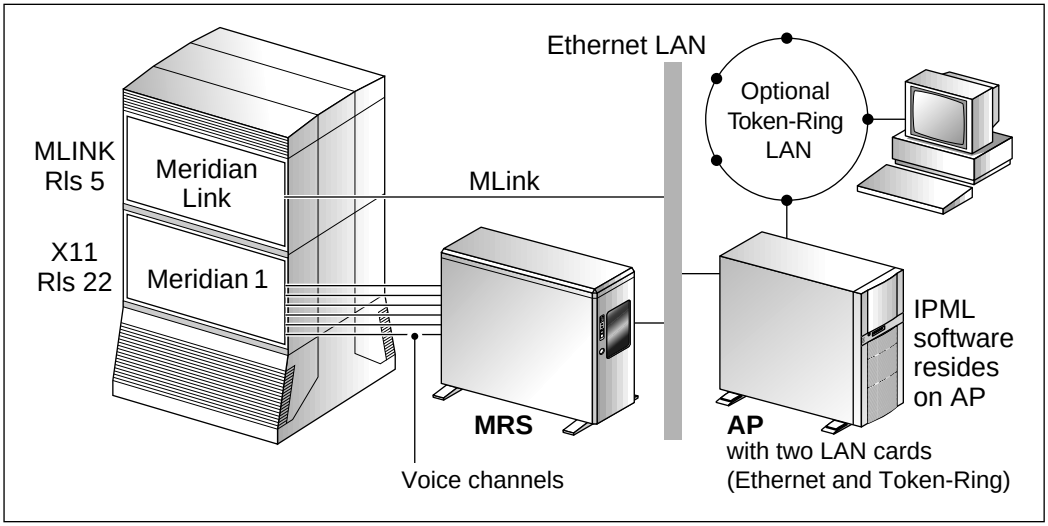
AP (or MRS/AP) and Meridian Link should exist on the same LAN. This means there should not be any LAN bridges or gateways between the AP and Meridian Link. The throughput of an Ethernet LAN is highest with small traffic (minimum number of packet collisions), but deteriorates rapidly as traffic on the LAN increases.

The AP (with IPML running on it) and MRS do not need to be on a dedicated LAN. But it is recommended that the AP (running the IPML) be on a dedicated LAN if the traffic on the already existing LAN is high. High traffic on the LAN can significantly reduce the performance of the IPML and IVR system.

Token Ring considerations

Meridian Link does not support Token Ring connectivity. As a result, when the connection between the MRS and the AP is over a Token Ring LAN, an additional Ethernet card in the AP is required for Meridian Link connectivity.

Figure 5-18: Meridian Link connectivity



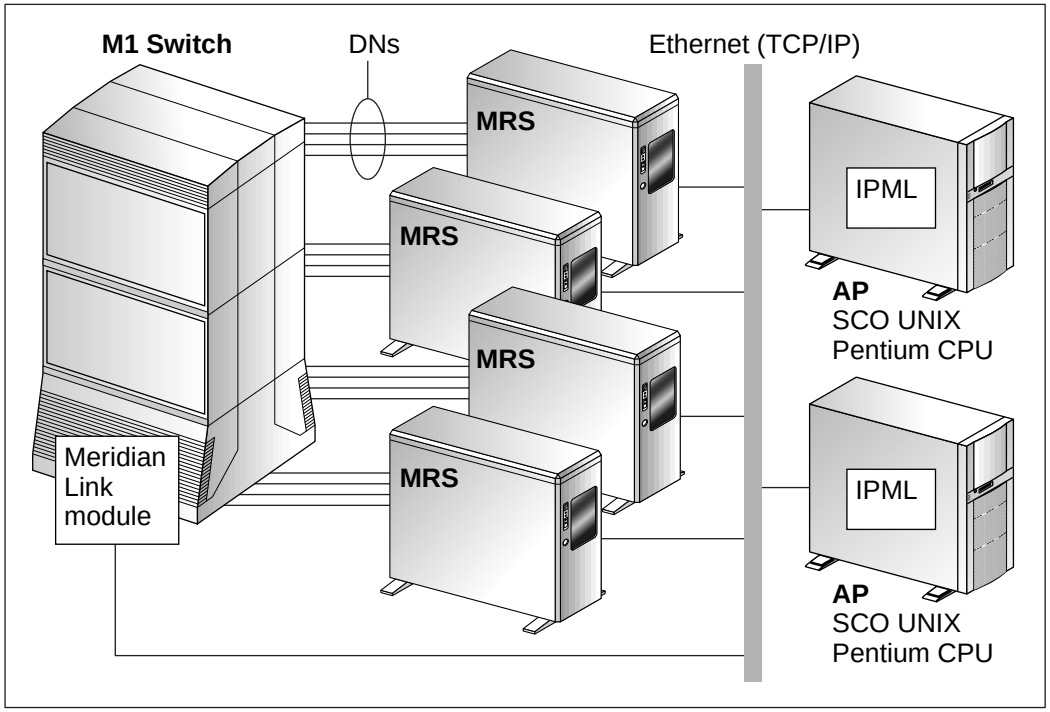
Networked IPML considerations

In this Scenario every AP should be running a separate copy of the IPML software. It is important to know that multiple copies of IPML could monitor the same DN.

Integrated Package for Meridian Link (IPML) connectivity

Please refer to Figure 5-19 for a connectivity example. In Figure 5-19, note that there is one Link module per M1 switch and one IPML per AP.

Figure 5-19: IPML connectivity example with multiple IPML, MRS, and APs



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SNMP considerations

In order for SNMP to function, the SNMP field must be set to ON in the AP configuration screen of the SCM.

Shared Development Environment (SDE)

Introduction

Shared Development Environment (SDE) is a feature of Symposium OPEN IVR 4.0. It permits multiple users to concurrently utilize available X11 and command line tools on a single IVR system. SDE will control whether an IVR tool can be run by a single user or multiple users. SDE also limits the number of simultaneous instances of the CUCB and XAE as specified in the license manager.

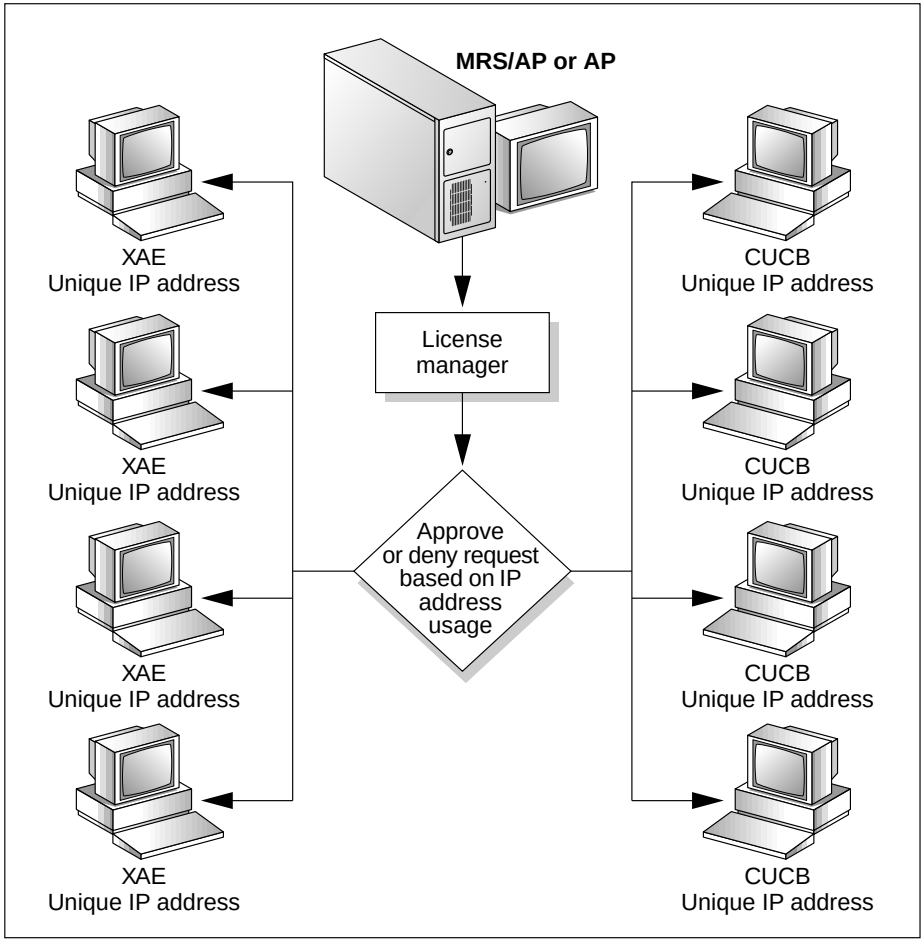
Single user tools

Table 5-141: Single user tools

Process name	Tool type	Single user
admingen	C/C++	Y
alrmcvt	C/C++	Y
audit	C/C++	Y
bup	C/C++	Y
chdisp	C/C++	N
cnvrt	C/C++	N
csysf	C/C++	Y
devnt	C/C++	N
dmsgd	C/C++	N
dpnd	C/C++	N
dsysf	C/C++	N
dtrkf	C/C++	N
exp	C/C++	Y
genshut	C/C++	Y
gmessage	C/C++	N
greset	C/C++	Y

Process name	Tool type	Single user
killall.sh	shell script	Y
lmdiag	C/C++	N
lmstat	C/C++	N
logcp	C/C++	N
makedepend.drv	shell script	N
mkproto.drv	shell script	N
mtrkf	C/C++	Y
mvpm	C/C++	Y
mvsnf	C/C++	Y
nedit	C/C++	N
ptype	C/C++	N
ralrm	C/C++	Y
rstat	C/C++	Y
sched	C/C++	Y
sconfig	C/C++	Y
sectool	shell script	N
shvsn	C/C++	N
statsbkup	C/C++	Y
version	shell script	N
vip_audit	C/C++	N
vlm_options	C/C++	N
vsn	C/C++	Y
xbup	C/C++	Y
xbupstart	shell script	Y

Figure 5-20: SDE diagram



X Windows Client

The process for accessing Symposium OPEN IVR 4.0 applications through a X Windows client is described in the Symposium OPEN IVR 4.0 Installation and Test Specification.

ADSI

In order for ADSI to function, the ADSI field must be set to ON in the AP configuration screen of the SCM. In addition, an ADSI compliant phone must be used by the caller.

PPP

PPP is setup and configured by the MIT process. Modifications can be made with netconfig utility. The default values are as follows:

Figure 5-21: PPP Dynamic Incoming Link configuration

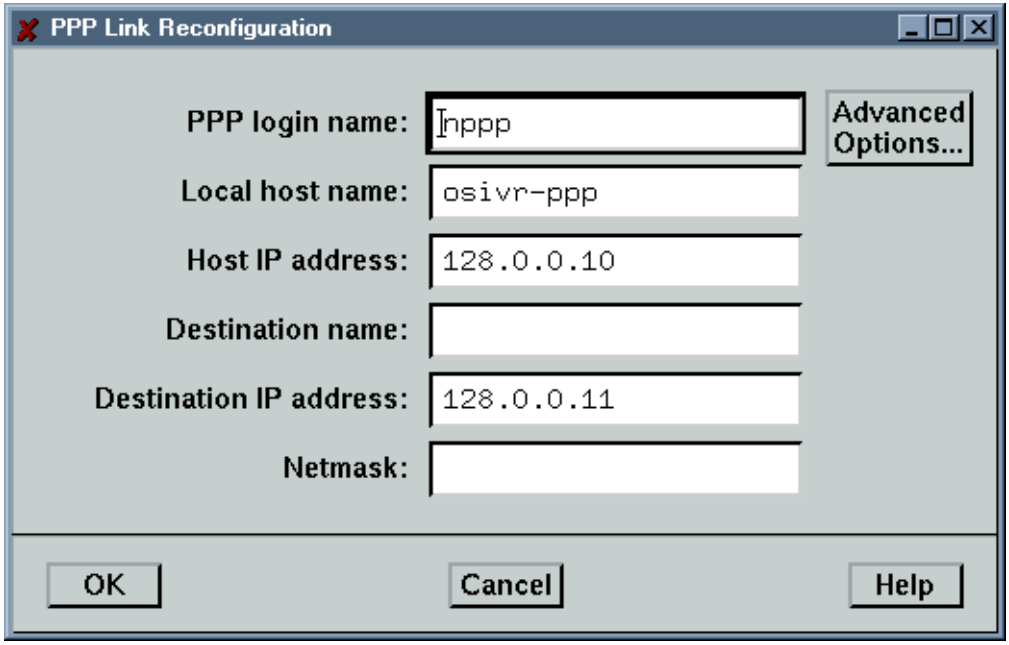
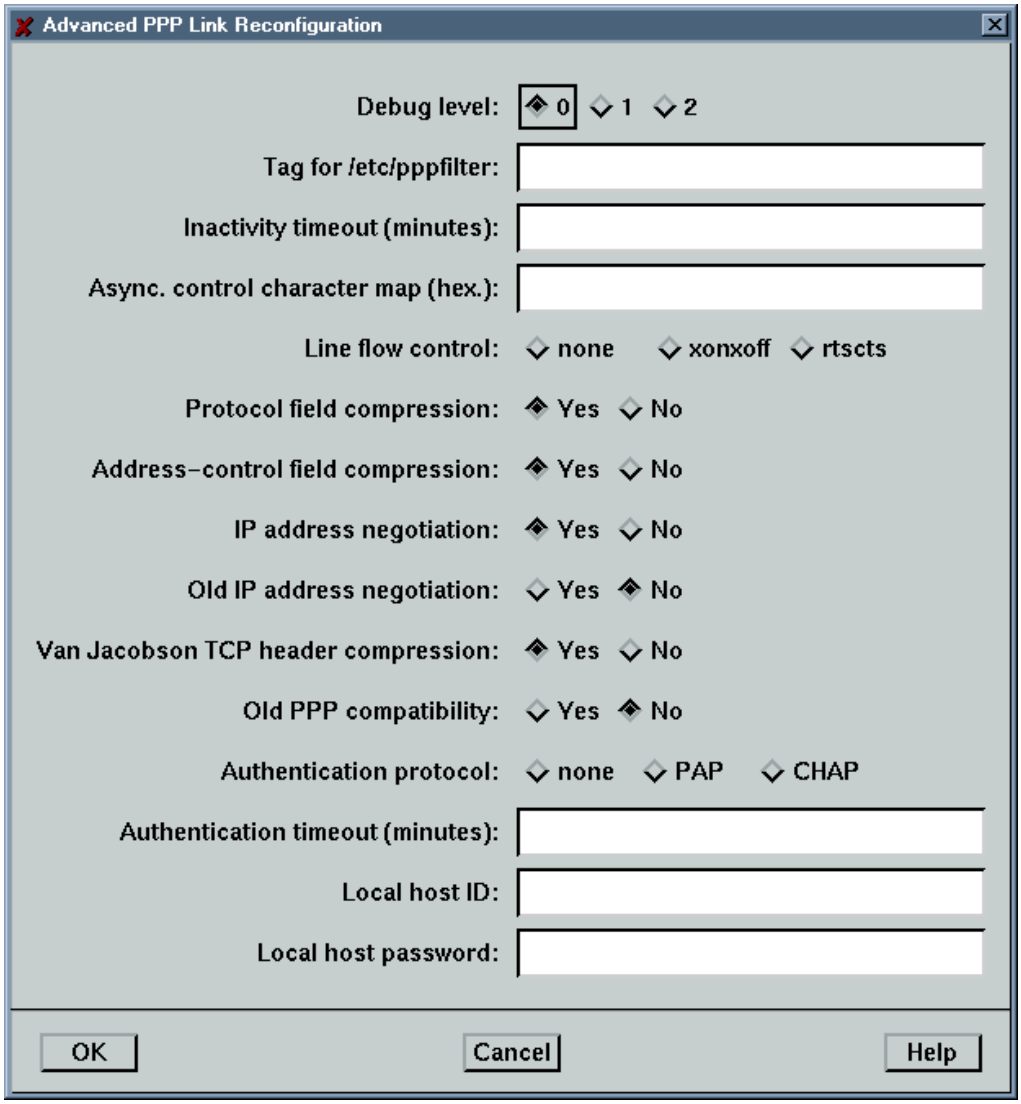


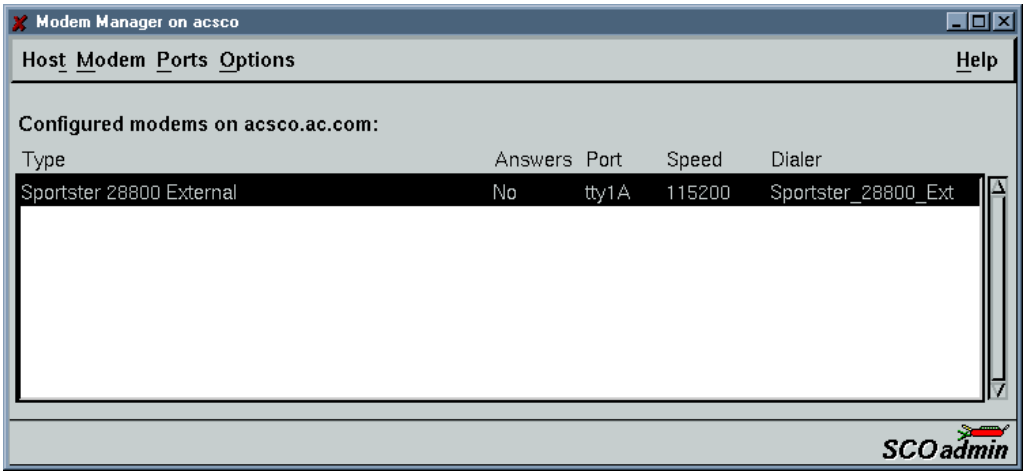
Figure 5-22: Advanced PPP Dynamic Incoming Link configuration


Advanced PPP Link Reconfiguration
Debug level: 0 1 2
Tag for /etc/pppfilter:
Inactivity timeout (minutes):
Async. control character map (hex.):
Line flow control: none xonxoff rtscts
Protocol field compression: Yes No
Address-control field compression: Yes No
IP address negotiation: Yes No
Old IP address negotiation: Yes No
Van Jacobson TCP header compression: Yes No
Old PPP compatibility: Yes No
Authentication protocol: none PAP CHAP
Authentication timeout (minutes):
Local host ID:
Local host password:
OK
Cancel
Help

Modem

The modem is setup and configured by the MIT process. Modifications can be made with the SCO modem manager utility. The modem must be set to Answer = Yes if dial in access is required. The default values are as follows:

Figure 5-23: Modem default values



ISDN PRI considerations

The default frame type/signaling for ISDN PRI is ESF/B8ZS. If a line is ordered without this signaling, it is recommended that the CSU provide the conversion. If no CSU is necessary, then the /usr/dialogic/data/dms.prm file can be edited to provide D4 framing, and/or AMI signaling.

When configuring the PRI system, do not use a loopback plug.

If connecting to a DMS 100 switch, the telco must provision the trunk with the following settings:

- LTDEF option (protocol table) set to NTNA
- LS1 profile option disabled

Chapter 6: Power consumption

Platform power consumption

R2 AP and MRS/AP power consumption

Table 6-1: R2 AP power consumption calculation

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
System Baseboard and CPU		10.0 A		0.06A	0.06A
Cooling fan (for two)				0.6A	
3.5-inch floppy drive		0.5A			
4-Gbyte hard drive		1.0A		0.7A	
Second 4-Gbyte hard drive		1.0A		0.7A	
2.5-Gbyte QIC tape drive		1.0A		2.0A	
SCSI CD-ROM drive		0.5A		0.4A	
Digital Audio Tape drive		0.44A		0.28A	
PCI Slot: ZNYX Ethernet card[a] **EISA Slot:** Madge ISA Token Ring card		1.2A 1.10A			

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
PCI Slot: 3COM Ethernet card (TN3270/5250)		0.25A		0.50A	
EISA Slot:					
Madge ISA Token Ring host card[1]		1.10A			
SYNC/570 SDLC card		0.75A		0.04A	0.04A
Digiboard (PC/Xe card)		1.8A		0.130A	0.110A
Digiboard (PC/Xem card) with Ports Module		3.6A			
PCI Slot: 3COM Ethernet card (IPML)		0.25A		0.50A	
Max total amperes used[b]		19.49A		5.37A	0.17A
Max total amperes used (adjusted)[c]		16.57A		4.56A	0.145A
Total available amperes	**32.0A[d]**	**40.0A**	**0.5A**	**17.0A**	**1.0A**
Max watts used[b]		82.85		54.72	1.74

a. Cards in a shaded row are mutually exclusive.
b. Configurations that maximize current/power consumption for each voltage rail may be different.
c. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.
d. Not connected to the motherboard.

Table 6-2: R2 AP configuration with max power consumption

Board/peripheral	Current in amperes					Qty used
	+3.3V	+5V	-5V	+12V	-12V	
System Baseboard and CPU		10.0 A		0.06A	0.06A	1
Cooling fan (for two)				0.6A		1
3.5-inch floppy drive		0.5A				1
4-Gbyte SCSI hard drive		1.0A		0.7A		2
2.5-Gbyte QIC tape drive		1.0A		2.0A		1
SCSI CD-ROM drive		0.5A		0.4A		1
Digital Audio Tape drive		0.44A		0.28A		1
ZNYX Ethernet card for LAN		1.2A				1
3COM Ethernet card for IPML		0.25A		0.50A		1
Digiboard PC/Xem with PORTS Module		3.6A				1
Total amperes used	0.0	19.49A	0.0	5.24A	0.06A	
Total amperes used (adjusted)[a]	0.0	16.57A	0.0	4.45A	0.051A	
Total available amperes	**32.0A[b]**	**40.0A**	**0.5A**	**17.0A**	**1.0A**	
Watts used	0.0	82.85	0.0	53.40	0.612	
Max total wattage (Max should be lower than 524W)[c]	**136.86**					

a. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.
b. Not connected to the motherboard.
c. Total current drawn at each voltage level should not exceed the max current that can be supplied at each voltage level.

Table 6-3: R2 MRS/AP power consumption calculation

Board/peripheral	Current in amperes				
	+3.3V	+5V	-5V	+12V	-12V
System baseboard and CPU		10.0 A		0.06A	0.06A
Cooling fan (for two)				0.6A	
3.5-inch floppy drive		0.5A			
4-Gbyte drive		1.0A		0.7A	
Second 4-Gbyte drive		1.0A		0.7A	
2.5-Gbyte QIC tape drive		1.0A		2.0A	
SCSI CD-ROM drive		0.5A		0.4A	
Digital Audio Tape drive		0.44A		0.28A	
EISA Slot: Loopstart Interface (LSI/120) [a] Loopstart Interface (LSI/80) E1 Interface (Aculab E1 Rev 4) T1 Interface (D/240SC-T1 Rev 1) T1 Interface (D/240SC-T1 Rev 2) Loopstart Interface (D/41ESC)		0.5A 0.5A 1.0A 4.3A 2.4A 1.25A		0.125A 0.125A 0.020A 0.030A 0.085A	0.125A 0.125A 0.020A 0.030A 0.085A
EISA Slot: 12 ports voice (D/121B)[1] 8 ports voice (D/81A) D/320SC Rev 1 D/320SC Rev 2		2.5A 2.5A 4.4A 2.0A		 0.020A 0.040A	 0.020A 0.040A
EISA Slot:2 Port Fax (TR114-I2P)		1.2A		0.05A	0.05A
EISA Slot:4 Port Fax (TR114-I4P)		1.8A		0.075A	0.075A
EISA Slot:8 Port Fax (TR114-I8P)		3.2A		0.150A	0.150A
EISA Slot: 16 port ASR (VRP) D= Number of 4 or 2 port daughter boards (VRM/40, VRM/2C)		2.0+0.31*(D)A			

Board/peripheral	Current in amperes				
	+3.3V	+5V	-5V	+12V	-12V
EISA Slot: Antares 2000/33		2.4A		0.020A	0.020A
EISA Slot: Antares 2000/50		2.6A		0.020A	0.020A
PCI Slot: ZNYX Ethernet Card[1] **EISA Slot:** Madge ISA Token Ring card		1.2A 1.10A			
PCI Slot: 3COM Ethernet card (TN3270/5250) EISA Slot: Madge ISA Token Ring host card[1] SYNC/570 SDLC card Digiboard (PC/Xe card) Digiboard (PC/Xem card) with Ports Module		0.25A 1.10A 0.75A 1.8A 3.6A		0.50A 0.04A 0.130A	 0.04A 0.110A
PCI Slot: 3COM Ethernet card (IPML)		0.25A		0.50A	
Max total amperes used[b]		39.93A		6.08A	0.72A
Max total amperes used (adjusted)[c]		33.94A		5.17A	0.612A
Total available amperes	**32.0A[d]**	**40.0A**	**0.5A**	**17.0A**	**1.0A**
Max watts used[b]		169.70		62.04	7.34

a. Cards in a shaded row are mutually exclusive.
b. Configurations that maximize current/power consumption for each voltage rail may be different
c. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.
d. Not connected to the motherboard.

Table 6-4: R2 MRS/AP configuration with max power consumption

Board/peripheral	Current in amperes					Qty used
	+3.3V	+5V	-5V	+12V	-12V	
System Baseboard and CPU		10.0 A		0.06A	0.06A	1
Cooling fan (for two)				0.6A		1
3.5-inch floppy drive		0.5A				1
4-Gbyte SCSI hard drive		1.0A		0.7A		2
2.5-Gbyte QIC tape drive		1.0A		2.0A		1
SCSI CD-ROM drive		0.5A		0.4A		1
Digital Audio Tape drive		0.44A		0.28A		1
ZNYX Ethernet card for LAN		1.2A				1
3COM Ethernet card for IPML		0.25A		0.50A		1
D/240SC-T1 Rev 1 board		4.3A		0.020A	0.020A	4
VR/160		3.24A				1
Digiboard PC/Xem + PORTS Module		3.6A				1
Total amperes used	0.0	39.93A	0.0	5.92A	0.14A	
Total amperes used (adjusted)[a]	0.0	33.94A	0.0	5.03A	0.119A	
Total available amperes	**32.0A**	**40.0A**	**0.5A**	**17.0A**	**1.0A**	
Watts used	0.0	170.0	0.0	60.36	1.43	
Max total wattage (Max should be lower than 524W)[b]	**231.79**					

a. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

b. Total current drawn at each voltage level should not exceed the max current that can be supplied at each voltage level.

R2 MRS/Rack power consumption

Table 6-5: R2 MRS/Rack power consumption calculation

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
CPU board (486-66 with 32 Mbytes of RAM)		2.7A		0.10A	0.10A
Display panel controller		1.00A			
Serial I/O controller board		0.75A			
SCSI controller board		0.51A			
3x80cfm cooling fans				0.9A	
3.5-inch floppy drive		0.5A			
1.2-Gbyte SCSI hard drive		0.65A		0.4A	
Second 1.2-Gbyte drive		0.65A		0.4A	
Third 1.2-Gbyte drive		0.65A		0.4A	
Fourth 1.2-Gbyte drive		0.65A		0.4A	
[a]**ISA Slot:** Loopstart Interface (LSI/120)		0.5A		0.125A	0.125A
Loopstart Interface (LSI/80)		0.5A		0.125A	0.125A
E1 Interface (Aculab E1)		1.0A			
T1 Interface (D/240SC-T1 Rev1)		4.3A		0.020A	0.020A
T1 Interface (D/240SC-T1 Rev2)		2.4A		0.030A	0.030A
Loopstart Interface (D/41ESC)		1.25A		0.085A	0.085A
ISA Slot: 12 Ports Voice (D/121B)		2.5A			
8 Ports Voice (D/81A)		2.5A			
D/320SC Rev 1		4.4A		0.020A	0.020A
D/320SC Rev 2		2.0A		0.040A	0.040A
ISA Slot: 2 Port Fax (TR114 series)		1.2A		0.05A	0.05A

	Current in amperes				
ISA Slot: 4 Port Fax (TR114 series)		1.8A		0.075A	0.075A
ISA Slot:8 Port Fax (TR114 series)		3.2A		0.150A	0.150A
ISA Slot: 16 port ASR (VRP) D= Number of 4- or 2-port daughter boards (VRM/40, VRM/2C)		2.0+ 0.31* (D) A			
ISA Slot: Antares 2000/33		2.4A		0.020A	0.020A
ISA Slot: Antares 2000/50		2.6A		0.020A	0.020A
ISA Slot: SMC Ethernet card ISA Slot: ISA Token Ring LAN card		1.2A 1.10A			
Total amperes used[b]	0.0	50.40	0.0	4.0	1.12
Total amperes used (adjusted)[c]	0.0	42.84	0.0	3.4	0.952
Total available amperes[d]	**0.0**	**50.0A**	**2.0A**	**8.0A**	**4.0A**
Watts used	0.0	214.20	0.0	40.8	11.42

a. Cards in a shaded row are mutually exclusive.

b. Configurations that maximize current/power consumption for each voltage rail may be different.

c. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

d. AC and DC power supplies have identical output rail voltage ratings.

Table 6-6: R2 MRS/Rack configuration with max power consumption

Board/peripheral	Current in amperes					Qty used
	+3.3V	+5V	-5V	+12V	-12V	
CPU board (486-66 with 32 Mbytes of RAM)		2.7A		0.10A	0.10A	1
Display panel controller		1.00A				1
Serial I/O controller board		0.75A				1
SCSI controller board		0.51A				1
3x80cfm cooling fans				0.9A		1
3.5-inch floppy drive		0.5A				1
1.2-Gbyte SCSI hard drive		0.65A		0.40A		4
Aculab 60-port E1 Rev 4		1.0A				1
D/320SC		4.4A		0.02A	0.02A	2
8-port fax board		3.2A		0.05A	0.05A	4
VR/160		3.24A				2
Antares 2000/50		2.6A		0.02A	0.02A	5
SMC Ethernet card		1.2A				1
Total amperes used	0.0	51.34	0.0	2.94	0.44	
Total amperes used (adjusted)[a]	0.0	43.64	0.0	2.50	0.374	
Total available amperes	**0.0**	**50.0A**	**2.0A**	**8.0A**	**4.0A**	
Watts used	0.0	218.20	0.0	30.0	4.49	
Max total wattage (Max should be lower than 400W)[b]	**252.69**					

a. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

b. Total current drawn at each voltage level should not exceed the max current that can be supplied at each voltage level.

R2 MRS/Tower power consumption

Two AC power supply models are supported in R2 MRS/Tower.

Table 6-7: R2 MRS/Tower power consumption calculation

Board/peripheral	Current in amperes				
	+3.3V	+5V	-5V	+12V	-12V
CPU board (486-66 with 32 Mbytes of RAM)		2.7A		0.10A	0.10A
Display panel controller		1.00A			
Serial I/O controller board		0.75A			
SCSI controller board		0.51A			
Dual cooling fans				0.7A	
3.5-inch floppy drive		0.5A			
1.2-Gbyte SCSI hard drive		0.65A		0.4A	
Second 1.2-Gbyte drive		0.65A		0.4A	
Third 1.2-Gbyte drive		0.65A		0.4A	
Fourth 1.2-Gbyte drive		0.65A		0.4A	
Digital Audio Tape drive		0.44A		0.28A	
CD-ROM drive		0.5A		0.4A	
ISA Slot: Loopstart Interface (LSI/120) [a]		0.5A		0.125A	0.125A
Loopstart Interface (LSI/80)		0.5A		0.125A	0.125A
E1 Interface (Aculab E1)		1.0A			
T1 Interface (D/240SC-T1 Rev1)		4.3A		0.020A	0.020A
		2.4A		0.030A	0.030A
T1 Interface (D/240SC-T1 Rev2)		1.25A		0.085A	0.085A
Loopstart Interface (D/41ESC)					

Board/peripheral	Current in amperes				
	+3.3V	+5V	-5V	+12V	-12V
ISA Slot: 12 Ports Voice (D/121B)[1] 8 ports Voice (D/81A) D/320SC		2.5A 2.5A 4.4A		 0.020A	 0.020A
ISA Slot:2 Port Fax (TR114 series)		1.2A		0.05A	0.05A
ISA Slot:4 Port Fax (TR114 series)		1.8A		0.075A	0.075A
ISA Slot:8 Port Fax (TR114 series)		3.2A		0.150A	0.150A
ISA Slot: 16 port ASR (VRP) D= Number of 4 or 2 port daughter boards (VRM/40, VRM/2C)		2.0+0.31*(D)A			
ISA Slot: Antares 2000/33		2.4A		0.020A	0.020A
ISA Slot: Antares 2000/50		2.6A		0.020A	0.020A
ISA Slot: SMC Ethernet card ISA Slot: ISA Token Ring LAN card		1.2A 1.10A			
Total amperes used[b]	0.0	51.34	0.0	4.68	1.12
Total amperes used (adjusted)[c]	0.0	43.64	0.0	3.98	0.952
Total available amperes (Model MAX-354-1205G)[d]	**0.0**	**50.0A**	**2.0A**	**8.0 A**	**4.0A**
Total available amperes (Model I450L-L3)[d]	**0.0**	**45.0A**	**0.5A**	**15 A**	**1.0A**
Watts used	0.0	218.20	0.0	47.76	11.42

a. Cards in a shaded row are mutually exclusive.

b. Configurations that maximize current/power consumption for each voltage rail may be different.

c. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

d. MAX-354-1205G is the current power supply. I450L-L3 has been manufacture discontinued.

Table 6-8: R2 MRS/Tower configuration with maximum power consumption

Board/peripheral	Current in amperes					Qty used
	+3.3V	+5V	-5V	+12V	-12V	
CPU board (486-66 with 32 Mbytes of RAM)		2.7A		0.10A	0.10A	1
Display panel controller		1.00A				1
Serial I/O controller board		0.75A				1
SCSI controller board		0.51A				1
Dual cooling fans				0.7A		1
3.5-inch floppy drive		0.5A				1
1.2-Gbyte SCSI hard drive		0.65A		0.40A		4
Aculab 60-port E1 Rev 4		1.0A				1
D/320SC		4.4A		0.02A	0.02A	2
8-port fax board		3.2A		0.05A	0.05A	4
VR/160		3.24A				2
Antares 2000/50		2.6A		0.02A	0.02A	5
SMC Ethernet card		1.2A				1
Total amperes used	0.0	51.34	0.0	2.74	0.44	
Total amperes used (adjusted)[a]	0.0	43.64	0.0	2.33	0.374	
Total available amperes (Model MAX-354-1205G)	**0.0**	**50.0A**	**2.0A**	**8.0A**	**4.0A**	
Total available amperes (Model I450L-L3)	**0.0**	**45.0A**	**0.5A**	**8.0A**	**1.0A**	
Watts used	0.0	218.20	0.0	27.96	4.49	
Max total wattage (Max should be lower than 400W)[b]	**250.65**					

a. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.
b. Total current drawn at each voltage level should not exceed the maximum current that can be supplied at each voltage level.

AP and MRS/AP power consumption

Table 6-9: AP (300tp) power consumption calculation

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
CPU board with 64 Mbytes of RAM		6.0A		1.5A	0.05A
Cooling fan (each)				0.2A	
Adaptec SCSI controller board AHA-2940		2.0A			
3.5-inch floppy drive		0.4A			
4-Gbyte SCSI hard drive		1.0A		0.7A	
Second 4-Gbyte drive		1.0A		0.7A	
SCSI CD-ROM drive		0.5A		0.4A	
4-Gbyte DAT tape drive		0.44A		0.28A	
PCI Slot: SVGA video card		1.5A			
PCI Slot: 3COM Ethernet card[a] **ISA Slot:** Madge ISA Token Ring card		0.25A 1.10A		0.50A	
PCI Slot: 3COM Ethernet card (IPML)[b]		0.25A		0.50A	
PCI Slot:3COM Ethernet card (TN3270/5250) **ISA Slot:** Madge ISA Token Ring host card[1] SYNC/570 SDLC card Digiboard (PC/Xem card) with Ports Module		0.25A 1.10A 0.75A 3.6A		0.50A 0.04A	0.04A
Max total amperes used[c]		17.79		4.82	0.09
Max total amperes used (adjusted)[d]	0.0	15.12	0.0	4.10	0.077
Total available amperes	**0.0A**	**50.0A**	**1.0A**	**11.0A**	**1.0A**
Max watts used	0.0	75.60	0.0	49.20	0.92

a. Cards in a shaded row are mutually exclusive.

b. An optional second 3COM card can be used for IPML communications.
c. Configurations that maximize current/power consumptions for each voltage rail may be different.
d. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

Table 6-10: AP (300tp) configuration with max power consumption

Board/peripheral	Current in amperes					Qty used
	+3.3V	+5V	-5V	+12V	-12V	
CPU board with 64 Mbytes of RAM		6.0A		1.5A	0.05A	1
Cooling fan (each)				0.2A		1
Adaptec SCSI controller board AHA-2940		2.0A				1
3.5-inch floppy drive		0.4A				1
4-Gbyte SCSI hard drive		1.0A		0.7A		2
SCSI CD-ROM drive		0.5A		0.4A		1
4-Gbyte DAT tape drive		0.44A		0.28A		1
SVGA video card		1.5A				1
3COM Ethernet card		0.25A		0.50A		2
Digiboard PC/Xem + PORTS Module		3.6A				1
Total amperes used		16.94		4.78	0.05	
Total amperes used (adjusted)[a]	0.0	14.40	0.0	4.06	0.043	
Total available amperes	**0.0A**	**50.0A**	**1.0A**	**11.0A**	**1.0A**	
Watts used	0.0	72.0	0.0	48.72	0.516	
Max total wattage (Max should be lower than 524W)[b]	**121.24**					

a. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

b. Total current drawn at each voltage level should not exceed the max current that can be supplied at each voltage level.

Table 6-11: MRS/AP power consumption calculation

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
CPU board with 64 Mbytes of RAM		6.0A		1.5A	0.05A
Cooling fan (each)				0.2A	
Adaptec SCSI controller AHA-2940		2.0A			
3.5-inch floppy drive		0.4A			
4-Gbyte SCSI hard drive		1.0A		0.7A	
Second 4-Gbyte drive		1.0A		0.7A	
SCSI CD-ROM drive		0.5A		0.4A	
4-Gbyte DAT tape drive		0.44A		0.28A	
PCI Slot: SVGA video card		1.5A			
ISA Slot: Loopstart (D/160SC-LS Rev 2) [a] E1 Interface (Aculab E1 Rev 5) T1 Interface (D/240SC-T1 Rev 2) Loopstart Interface (D/41ESC)		1.5A 1.5A 2.4A 1.25A		0.375A 0.030A 0.085A	0.250A 0.030A 0.085A
ISA Slot: D/320SC Rev 2		2.0A		0.040A	0.040A
ISA Slot:4 Port Fax (GammaLink CP4/SC)		1.3A	0.008A	0.030A	0.030A
ISA Slot:6 Port Fax (GammaLink CP6/SC)		1.5A	0.030A	0.018A	0.018A
ISA Slot:12 Port Fax (GammaLink CP12/SC)		2.4A	0.058A	0.018A	0.018A
ISA Slot: Antares 2000/50		2.6A		0.020A	0.020A
PCI Slot: 3COM Ethernet Card[1] **ISA Slot**: Madge ISA Token Ring LAN card		0.25A 1.10A		0.50A	
PCI Slot: 3COM Ethernet card (IPML)[b]		0.25A		0.50A	

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
PCI Slot: 3COM Ethernet card (TN3270/5250)		0.25A		0.50A	
ISA Slot: Madge ISA Token Ring host card		1.10A		0.04A	0.04A
Arnet SDLC card		0.75A		0.04	0.04
Digiboard (PC/Xem card) with Ports Module		3.6A			
Max total amperes used[c]	0.0	36.74A	0.348A	6.44A	1.2A
Max total amperes used (adjusted)[d]	0.0	31.23A	0.296A	5.47A	1.02A[e]
Total available amperes	**0.0A**	**50.0A**	**1.0A**	**11.0A**	**1.0A**
Max watts used[b]	0.0	156.15	1.48	65.64	12.24

a. Cards in a shaded row are mutually exclusive.
b. A second 3COM can be used for IPML communications.
c. Configurations that maximize current/power consumption for each voltage rail may be different.
d. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.
e. Instead of using the typical maximum current consumption for each component, the maximum possible current consumption values are used in the calculations. Therefore, a tolerance rate of 5% is allowed.

Table 6-12: MRS/AP configuration with max power consumption

Board/peripheral	Current in amperes					Qty used
	+3.3V	+5V	-5V	+12V	-12V	
CPU board with 64 Mbytes of RAM		6.0A		1.5A	0.05A	1
Cooling fan (each)				0.2A		1
Adaptec SCSI controller board AHA-2940		2.0A				1
3.5-inch floppy drive		0.4A				1
4.5 Gbyte SCSI hard drive		1.0A		0.7A		2
SCSI CD-ROM drive		0.5A		0.4A		1
4-Gbyte DAT tape drive		0.44A		0.28A		1
SVGA video card		1.5A				1
3COM Ethernet card		0.25A		0.50A		2
Digiboard PC/Xem + PORTS Module		3.6A				1
D/160SC-LS		1.5A		0.375A	0.25A	4
Antares 2000/50		2.6A		0.02A	0.02A	4
Total amperes used	0.0	33.34	0.0	6.36	1.13	
Total amperes used (adjusted)[a]	0.0	28.34	0.0	5.41	0.96	
Total available amperes	**0.0**	**50.0A**	**1.0A**	**11.0 A**	**1.0A**	
Watts used	0.0	141.70	0.0	64.92	11.52	
Max total wattage (MAX should be lower than 400W)[b]	**218.14**					

a. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

b. Total current drawn at each voltage level should not exceed the max current that can be supplied at each voltage level.

AP (700tp) and MRS/AP (700tp) power consumption

Power consumption of the AP (700tp)

Table 6-13: AP (700tp) power consumption calculation

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
CPU board with 64 Mbytes of RAM		7.0A		0.10A	0.10A
Cooling fans (triple-fan assembly)				0.30A	
4.5 Gbyte SCSI hard drive		1.0A		0.7A	
Second 4.5 Gbyte hard disk		1.0A		0.7A	
3.5-inch floppy drive		0.4A			
SCSI CD-ROM drive		0.5A		0.4A	
4-Gbyte DAT tape drive		0.44A		0.28A	
PCI Slot: SVGA video card		1.5A			
PCI Slot: 3COM Ethernet card[a] **ISA Slot:** Madge ISA Token Ring card		0.25A 1.10A		0.50A	
PCI Slot: 3COM Ethernet card (IPML)[b]		0.25A		0.50A	
PCI Slot:3COM Ethernet card (TN3270/5250) **ISA Slot:** Madge I SA Token Ring host card Arnet SDLC card Digiboard (PC/Xem card) with Ports Module		0.25A 1.10A 0.75A 3.6A		0.50A 0.04A	0.04A
Max total amperes used[c]	0.0	16.79A	0.0	3.52A	0.14A
Max total amperes used (Adjusted)[d]	0.0	14.27A	0.0	2.99A	0.119A
Total available amperes	**0.0A**	**45.0A**	**1.0A**	**8.0A**	**2.0A**
Max watts used	0.0	71.35	0.0	35.88	1.43

a. A second 3COM can be used for IPML communications.
b. A second 3COM can be used for IPML communications.

c. Configurations that maximize current/power consumption for each voltage rail may be different.
d. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

AP (700tp) configuration with max power consumption

Board/peripheral	Current in amperes					Qty used
	+3.3V	+5V	-5V	+12V	-12V	
CPU board (P-200 with 64 Mbytes of RAM)		7.0A		1.10A	0.10A	1
Cooling fan (triple fan assembly)				0.30A		1
4.5 Gbyte SCSI hard drive		1.0A		0.7A		2
3.5-inch floppy drive		0.4A				1
SCSI CD-ROM drive		0.5A		0.4A		1
4-Gbyte DAT tape drive		0.44A		0.28A		1
SVGA video card		1.5A				1
Digiboard PC/Xem + PORTS Module		3.6A				1
Madge Token Ring for LAN		1.10A				1
3COM Ethernet for IPML		0.25A		0.50A		1
Total amperes used	0.0	16.79	0.0	2.48	0.10	
Total amperes used (Adjusted)[a]	0.0	14.27	0.0	2.11	0.085	
Total available amperes	**0.0A**	**50.0A**	**1.0A**	**11.0A**	**1.0A**	
Watts used	0.0	71.35	0.0	25.32	1.02	
Max total wattage (Max should be lower than 350W)[b]	**97.69**					

a. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

b. Total current drawn at each voltage level should not exceed the max current that can be supplied at each voltage level.

Consumption of the MRS/AP (700tp)

Table 6-14: MRS/AP (700tp) power consumption calculation

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
CPU board with 64 Mbytes of RAM		7.0A		0.10A	0.10A
Cooling fans (triple-fan assembly)				0.30A	
4.5 Gbyte SCSI hard drive		1.0A		0.7A	
Second 4.5 Gbyte hard disk		1.0A		0.7A	
3.5-inch floppy drive		0.4A			
SCSI CD-ROM drive		0.5A		0.4A	
4-Gbyte DAT tape drive		0.44A		0.28A	
PCI Slot: SVGA video card		1.5A			
PCI Slot: 3COM Ethernet card[a] **ISA Slot:** Madge ISA Token Ring card		0.25A 1.10A		0.50A	
ISA Slot: Loopstart (D/160SC-LS Rev 2)[a] E1 Interface (Aculab E1 Rev 5) T1 Interface (D/240SC-T1 Rev 2) Loopstart Interface (D/41ESC)		1.5A 1.5A 2.4A 1.25A		0.375A 0.30A 0.085A	0.250A 0.30A 0.085A
ISA Slot: D/320SC Rev 2		2.0A		0.040A	0.040A
ISA Slot: 4 Port Fax (GammaLink CP4/SC)		1.3	0.08A	0.030A	0.030A
ISA Slot: 6 Port Fax (GammaLink CP6/SC)		1.5A	0.030A	0.018A	0.018A
ISA Slot: 12 Port Fax (GammaLink CP12/SC)		2.4A	0.058A	0.018A	0.018A
ISA Slot: Antares 2000/50		2.6A		0.020A	0.020A
PCI Slot: 3COM Ethernet card (IPML)[b]		0.25A		0.50A	

	Current in amperes				
PCI Slot:3COM Ethernet card (TN3270/5250) **ISA Slot:** Madge ISA Token Ring host card Arnet SDLC card Digiboard (PC/Xem card) with Ports Module		0.25A 1.10A 0.75A 3.6A		0.50A 0.04A	0.04A
Max total amperes used[c]	0.0	48.39	0.348	6.70	2.32
Max total amperes used (Adjusted)[d]	0.0	41.13	0.296	5.70	1.97
Total available amperes	**0.0A**	**45.0A**	**1.0A**	**8.0A**	**2.0A**
Max watts used[b]	0.0	205.65	1.48	68.40	23.64

a. Cards in a shaded row are mutually exclusive.

b. A second 3COM can be used for IPML communications.

c. Configurations that maximize current/power consumption for each voltage rail may be different.

d. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

Table 6-15: MRS/AP (700tp) configuration with max power consumption

Board/peripheral	Current in amperes					Qty used
	+3.3V	+5V	-5V	+12V	-12V	
CPU board (P-200 with 64 Mbytes of RAM)		7.0A		1.10A	0.10A	1
Cooling fans (triple fan assembly)				0.30A		1
4.5 Gbyte SCSI hard drive		1.0A		0.7A		2
3.5-inch floppy drive		0.4A				1
SCSI CD-ROM drive		0.5A		0.4A		1
4-Gbyte DAT tape drive		0.44A		0.28A		1
SVGA video card		1.5A				1
Digiboard PC/Xem + PORTS Module		3.6A				1
Madge Token Ring for LAN		1.10A				1
3COM Ethernet for IPML		0.25A		0.50A		1
D/160SC-LS		1.5A		0.375A	0.250A	8
Antares 2000/50		2.6A		0.020A	0.020A	5
Total amperes used	0.0	41.79	0.0	6.08	2.20	
Total amperes used (Adjusted)[a]	0.0	35.52	0.0	5.17	1.87	
Total available amperes	**0.0A**	**45.0A**	**1.0A**	**8.0A**	**2.0A**	
Watts used	0.0	177.6	0.0	62.04	22.44	
Max total wattage (Max should be lower than 350W)[b]	**262.08**					

a. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

b. Total current drawn at each voltage level should not exceed the max current that can be supplied at each voltage level.

MRS/Tower (700tp) power consumption

Table 6-16: MRS/Tower power consumption calculation

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
CPU board (P-200 with 64 Mbytes of RAM)		7.0A		0.10A	0.10A
Cooling Fans (triple-fan assembly)				0.30A	
4-Gbyte SCSI hard disk		1.0A		0.7A	
Second 4-Gbyte hard disk		1.0A		0.7A	
3.5-inch floppy drive		0.4A			
SCSI CD-ROM drive		0.5A		0.4A	
4-Gbyte DAT drive		0.44A		0.28A	
PCI Slot: SVGA video card		1.5A			
ISA Slot: Loopstart (D/160SC-LS Rev 2) [a] E1 Interface (Aculab E1 Rev5) T1 Interface (D/240SC-T1 Rev 2) Loopstart Interface (D/41ESC)		1.5A 1.5A 2.4A 1.25A		0.375A 0.030A 0.085A	0.250A 0.030A 0.085A
ISA Slot: D/320SC Rev 2		2.0A		0.040A	0.040A
ISA Slot:4 Port Fax (GammaLink CP4/SC)		1.3A	0.008A	0.030A	0.030A
ISA Slot:6 Port Fax (GammaLink CP6/SC)		1.5A	0.030A	0.018A	0.018A
ISA Slot:12 Port Fax (GammaLink CP12/SC)		2.4A	0.058A	0.018A	0.018A
ISA Slot: Antares 2000/50		2.6A		0.020A	0.020A
PCI Slot: 3COM Ethernet card[1] **ISA Slot:** Madge token ring card		0.25A 1.10A		0.50A	
Max total amperes used[b]	0.0	52.09A	0.348A	6.22A	2.24A
Max total amperes used (adjusted)[c]	0.0	44.28A	0.296A	5.29A	1.904A
Total available amperes	**0.0**	**45.0A**	**1.0A**	**8.0A**	**2.0A**
Max watts used[b]	0.0	221.40	1.74	63.48	22.85

a. Cards in a shaded row are mutually exclusive.
b. Configurations that maximize current/power consumption for each voltage rail may be different.
c. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

Table 6-17: MRS/Tower configuration with max power consumption

Board/peripheral	Current in amperes					Qty used
	+3.3V	+5V	-5V	+12V	-12V	
CPU board (P-200 with 64 Mbytes of RAM)		7.0A		0.10A	0.10A	1
Cooling Fans (triple-fan assembly)				0.30A		1
4-Gbyte SCSI hard disk		1.0A		0.7A		2
3.5-inch floppy drive		0.4A				1
SCSI CD-ROM drive		0.5A		0.4A		1
4-Gbyte DAT drive		0.44A		0.28A		1
SVGA video card		1.5A				1
D/240SC-T1		2.4A		0.03A	0.03A	5
Antares 2000/50		2.6A		0.02A	0.02A	8
GammaLink CP/12-SC		2.4A	0.058	0.018	0.018	3
3COM Ethernet card		0.25A		0.50A		1
Total amperes used	0.0	52.09	0.174	3.344	0.364	
Total amperes used (adjusted)[a]	0.0	44.28	0.148	2.842	0.309	
Total available amperes	**0.0**	**45.0A**	**1.0A**	**8.0A**	**2.0A**	
Watts used	0.0	221.40	0.74	34.10	3.71	
Max total wattage (MAX should be lower than 350W)[b]	**259.21**					

a. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

b. Total current drawn at each voltage level should not exceed the max current that can be supplied at each voltage level.

Rack AP and MRS/Rack (1000rp) power consumption

Table 6-18: MRS/Rack (1000rp) power consumption calculation

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
CPU board with 64 Mbytes of RAM		7.0A		0.10A	0.10A
Cooling Fans (triple-fan assembly)				0.60A	
4-Gbyte SCSI hard disk		1.0A		0.7A	
Second 4-Gbyte hard disk		1.0A		0.7A	
3.5-inch floppy drive		0.4A			
SCSI CD-ROM drive		0.5A		0.4A	
4-Gbyte DAT drive		0.44A		0.28A	
PCI Slot: SVGA video card		1.5A			
ISA Slot: Loopstart (D/160SC-LS Rev 2)[a] E1 Interface (Aculab E1 Rev 5) T1 Interface (D/240SC-T1 Rev 2) Loopstart Interface (D/41ESC)		1.5A 1.5A 2.4A 1.25A		0.375A 0.030A 0.085A	0.250A 0.030A 0.085A
ISA Slot: D/320SC Rev 2		2.0A		0.040A	0.040A
ISA Slot:4 Port Fax (GammaLink CP4/SC)		1.3A	0.008A	0.030A	0.030A
ISA Slot:6 Port Fax (GammaLink CP6/SC)		1.5A	0.030A	0.018A	0.018A
ISA Slot:12 Port Fax (GammaLink CP12/SC)		2.4A	0.058A	0.018A	0.018A
ISA Slot: Antares 2000/50		2.6A		0.020A	0.020A
PCI Slot: 3COM Ethernet card[1] **ISA Slot:** Madge Token Ring LAN card		0.25A 1.10A		0.50A	
Max total amperes used[b]	0.0	52.09A	0.348A	4.90A	1.22A
Max total amperes used (adjusted)[c]	0.0	44.28A	0.296A	4.17A	1.04A[d]
Total available amperes	**0.0**	**50.0A**	**0.5A**	**8.0A**	**1.0A**

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
Max watts used[b]	0.0	221.40	1.48	50.04	12.48

a. Cards in a shaded row are mutually exclusive.
b. Configurations that maximize current/power consumption for each voltage rail may be different.
c. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.
d. Instead of using the typical maximum current consumption for each component, the maximum possible current consumption values are used in the calculations. Therefore, a tolerance rate of 5% is allowed.

Table 6-19: MRS/Rack configuration with max power consumption

Board/peripheral	Current in amperes					Qty used
	+3.3V	+5V	-5V	+12V	-12V	
CPU board with 64 Mbytes of RAM		7.0A		0.10A	0.10A	1
Cooling Fans (triple-fan assembly)				0.60A		1
4-Gbyte SCSI hard disk		1.0A		0.7A		2
3.5-inch floppy drive		0.4A				1
SCSI CD-ROM drive		0.5A		0.4A		1
4-Gbyte DAT drive		0.44A		0.28A		1
SVGA video card		1.5A				1
D/240SC-T1		2.4A		0.03A	0.03A	5
Antares 2000/50		2.6A		0.02A	0.02A	8
GammaLink CP/12-SC		2.4A	0.058A	0.018A	0.018A	3
3COM Ethernet card		0.25A		0.50A		1
Total amperes used	0.0	52.09	0.174	3.64	0.364	
Total amperes used (adjusted)[a]	0.0	44.28	0.148	3.09	0.309	
Total available amperes		**50.0A**	**0.5A**	**8.0A**	**1.0A**	
Watts used		221.40	0.740	37.08	3.71	
Max total wattage (MAX should be lower than 400W)[b]	**262.93**					

a. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

b. Total current drawn at each voltage level should not exceed the max current that can be supplied at each voltage level.

Table 6-20: Rack AP (1000rp) power consumption calculation

	Current in amperes				
Board/peripheral	**+3.3V**	**+5V**	**-5V**	**+12V**	**-12V**
CPU board with 64 Mbytes of RAM		7.0A		0.10A	0.10A
Cooling Fans (triple-fan assembly)				0.60A	
4-Gbyte SCSI hard disk		1.0A		0.7A	
Second 4-Gbyte hard disk		1.0A		0.7A	
3.5-inch floppy drive		0.4A			
SCSI CD-ROM drive		0.5A		0.4A	
4-Gbyte DAT drive		0.44A		0.28A	
PCI Slot: SVGA video card		1.5A			
PCI Slot: 3COM Ethernet card[a] ISA Slot: Madge Token Ring LAN card		0.25A 1.10A		0.50A	
PCI Slot: 3COM Ethernet card (IPML)[b]		0.25A		0.50A	
PCI Slot: 3COM Ethernet card (TN3270/5250) **ISA Slot:** Madge ISA Token Ring host card[1] SYNC/570 SDLC card Digiboard (PC/Xem card) with Ports Module		0.25A 1.10A 0.75A 3.6A		0.50A 0.04A	0.04A
Max total amperes used[c]	0.0	16.79A	0.0	3.82A	0.14A
Max total amperes used (adjusted)[d]	0.0	14.27A	0.0	3.25A	0.119A
Total available amperes	**0.0**	**50.0A**	**0.5A**	**8.0 A**	**1.0A**
Max watts used[b]	0.0	71.35	0.0	39.0	1.43

a. Cards in a shaded row are mutually exclusive.
b. An optional second 3COM ethernet card can be used for IPML communications.
c. Configurations that maximize current/power consumption for each voltage rail may be different.

d. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

Table 6-21: Rack AP configuration with max power consumption

Board/peripheral	Current in amperes					Qty used
	+3.3V	+5V	-5V	+12V	-12V	
CPU board with 64 Mbytes of RAM		7.0A		0.10A	0.10A	1
Cooling Fans (triple-fan assembly)				0.60A		1
4-Gbyte SCSI hard disk		1.0A		0.7A		2
3.5-inch floppy drive		0.4A				1
SCSI CD-ROM drive		0.5A		0.4A		1
4-Gbyte DAT drive		0.44A		0.28A		1
SVGA video card		1.5A				1
Digiboard PC/Xem + PORTS Module		3.6A				1
3COM Ethernet card		0.25A		0.50A		2
Total amperes used		15.94		3.78	0.10	
Total amperes used (adjusted)[a]		13.55		3.21	0.085	
Total available amperes		**50.0A**	**0.5A**	**8.0A**	**1.0A**	
Watts used		67.75		38.52	1.02	
Max total wattage (MAX should be lower than 400W)[b]	**107.29**					

a. Components will not all simultaneously and continuously draw the maximum current from the power supply. To reflect this, the total number of amperes drawn from the power supply on any of the power supply's voltage rails is adjusted by using a utilization factor of 85%.

b. Total current drawn at each voltage level should not exceed the max current that can be supplied at each voltage level.

Board power consumption

Table 6-22: Telephony boards

Telephony boards	Current in amperes			
	+5V	-5V	+12V	-12V
Aculab E1 Rev 4 (30 ports)	1.0			
Aculab E1 Rev 4 (60 ports)	1.0			
Aculab E1 Rev 5 (30 ports)	1.5			
Aculab E1 Rev 5 (60 ports)	1.5			
BrookTrout 2 Port Fax (TR114-I2P)	1.2		0.050	0.050
BrookTrout 4 Port Fax (TR114-I4P)	1.8		0.075	0.075
BrookTrout 8 Port Fax (TR114-I8P)	3.2		0.15	0.15
Dialogic D/240SC-T1 Rev 1	4.3		0.020	0.020
Dialogic D/240SC-T1 Rev 2	2.4		0.030	0.030
Dialogic D/41ESC	1.25		0.085	0.085
Dialogic D/160SC-LS Rev 2	1.5		0.375	0.250
Dialogic D/81A	2.5			
Dialogic D/121B	2.5			
Dialogic D/320SC Rev 1	4.4		0.020	0.020
Dialogic D/320SC Rev 2	2.0		0.040	0.040
Dialogic VR/160 D= Number of 4- or 2-port daughter boards (VRM/40, VRM/2C)	2.0 + 0.31*D			
Dialogic Antares 2000/33	2.4		0.020	0.020
Dialogic Antares 2000/50	2.6		0.020	0.020
Dialogic GammaLink Fax CP/4-SC	1.3	0.008	0.018	0.018
Dialogic GammaLink Fax CP/6-SC	1.5	0.030	0.018	0.018

Telephony boards	Current in amperes			
	+5V	-5V	+12V	-12V
Dialogic GammaLink Fax CP/12-SC	2.4	0.058	0.018	0.018
Dialogic LSI/80	0.5		0.125	0.125
Dialogic LSI/120	0.5		0.125	0.125

Table 6-23: Host communications boards

Host communication boards	Current in amperes			
	+5V	-5V	+12V	-12V
Madge SmartAT 16/4 ISA Token Ring	1.10			
SYNC/570 Sync/570	0.75		0.040	0.040
Digiboard PC/Xe	1.8		0.13	0.11
Digiboard PC/Xem with PORTS/16 Module	3.6			

Table 6-24: Network (LAN) boards

LAN boards	Current in amperes			
	+5V	-5V	+12V	-12V
ZNYX PCI EtherAction ZX312B	1.20			
3COM PCI EtherLink XL 3C900-COMBO	0.25		0.50	
SMC ISA 8216C Ethernet	1.20			
Madge ISA SmartAT 16/4 Token Ring	1.10			

Chapter 7: Slot allocation

Introduction

The Release 2 AP or MRS/AP computer bus has two PCI slots, five EISA/ISA slots, and one shared EISA/ISA/PCI slot. The shared slot can be used for either a PCI card or an EISA/ISA card but not both at the same time. The shared slot is used as an ISA slot by Symposium OPEN IVR 4.0. All ISA slots in the Release 2 AP or MRS/AP are identical.

The computer bus of the R2 MRS/Tower and R2 MRS/Rack is ISA. There are 20 ISA slots in the R2 MRS/Rack and either 18 or 20 ISA slots in the R2 MRS/Tower. The 20 slot backplane for the R2 MRS/Tower has replaced the 18 slot backplane, effective December 1996. All ISA slots in either the R2 MRS/Tower or R2 MRS/Rack are identical.

The Tower AP and MRS/AP computer bus has 4 PCI slots, 8 ISA slots and 2 ISA-PCI CPU[1] slots. The Tower AP and MRS/AP systems can support two CPU boards, however only one CPU board will be supported in Symposium OPEN IVR 4.0 allowing the second CPU slot to be utilized as a regular ISA slot. All ISA slots are identical.

The MRS/Tower (700tp), AP (700tp), MRS/AP (700tp), MRS/Rack and AP/Rack computer buses are identical and have 3 PCI slots, 16 ISA slots and 1 ISA-PCI CPU slot. The ISA slot closest to the CPU board will be occupied by the COM2 / PS/2 mouse connectors and thus cannot be used by any ISA cards. All ISA slots are identical.

1. A ISA-PCI CPU slot consists of an ISA slot **inline** with a PCI slot and can be used by a CPU board that inserts into both slots simultaneously or an ISA board that inserts into the ISA slot.

Release 2 AP slot assignment

Table 7-1 shows the slot assignment in the Release 2 AP.

Table 7-1: Release 2 AP base slot allocation

Slot type	Slot assignment
PCI-3	Ethernet card (for connectivity to the MRS, IPML and/or for host connectivity)
PCI-2[a]	Ethernet card
PCI-1	Not used
PCI-2	Ethernet card (for connectivity to the MRS, IPML and/or for host connectivity)
PCI-1[b]	Ethernet card
EISA-6	EISA slots 1-6 are used for a host connectivity card and/or Token Ring LAN card for connectivity to the MRS.
EISA-5	
EISA-4	
EISA-3	
EISA-2	
EISA-1	

a. Used if customer orders a LAN card dedicated to IPML communications (optional).

b. Used if customer orders a LAN card dedicated to IPML communications (optional).

Note: The Release 2 AP has a label inside the chassis indicating how the PCI and EISA slots are numbered.

Release 2 MRS/AP slot assignment

The table below shows the slot assignment in the Release 2 MRS/AP.

Table 7-2: MRS/AP base slot allocation

Slot type	Slot assignment
PCI-3	Ethernet card (for connectivity to IPML and/or for host connectivity)
PCI-2[a]	Ethernet card
PCI-1	Not used
EISA-6	EISA slots 1-6 are used for PEB cards, host connectivity cards and/or Token Ring card to customer LAN.
EISA-5	
EISA-4	
EISA-3	
EISA-2	
EISA-1	

a. Used if customer orders a LAN card dedicated to IPML communications (optional).

Note: The Release 2 MRS/AP has a label inside the chassis indicating how the PCI and EISA slots are numbered.

R2 MRS/Tower slot assignment (18 & 20 slots)

The 18 slot MRS/Tower uses the older backplane, which has been replaced by the newer 20 slot backplane, effective December 1996.

Table 7-3: R2 MRS/Tower base slot allocation (18 slots)

Slot number	Module	Module description
Slot 1	CPU module	CPU module
Slot 2	Ethernet/Token Ring card	SMC Ethernet card or Madge Token Ring card
Slot 3	Serial I/O card	Print port and Port B
Slot 4	Serial I/O card	Port A and Alarms
Slot 5-16	PEB cards	PEB cards include network interface, voice processing, voice recognition, text-to-speech, fax.
Slot 17	SCSI Disk card	SCSI disk controller
Slot 18	Display card	Display controller

Table 7-4: R2 MRS/Tower base slot allocation (20 Slots)

Slot number	Module	Module description
Slot 1	CPU module	CPU module
Slot 2	Ethernet/Token Ring card	SMC Ethernet card or Madge Token Ring card
Slot 3-16	PEB cards	PEB cards include network interface, voice processing, voice recognition, text-to-speech, fax.
Slot 17	Serial I/O	Print port and Port B
Slot 18	Serial I/O	Port A and Alarm
Slot 19	SCSI Disk card	SCSI disk controller
Slot 20	Display card	Display controller

Note: The R2 MRS/Tower slots are numbered on the passive backplane next to each slot.

R2 MRS/Rack slot assignment

The table below shows the slot assignment in the R2 MRS/Rack.

Table 7-5: R2 MRS/Rack base slot allocation

Slot number	Module	Module description
Slot 1	Serial I/O card	2 serial ports and 1 printer port
Slot 2	CPU module	CPU module
Slot 3	Ethernet/Token Ring card	SMC Ethernet card or Madge Token Ring card
Slot 4-18	PEB cards	PEB cards include network interface, voice processing, voice recognition, text-to-speech, fax.
Slot 19	SCSI Disk card	SCSI disk controller
Slot 20	Display card	Display controller

Note: The R2 MRS/Rack slots are numbered on the passive backplane next to each slot.

AP (300tp) slot assignment

The table below shows the slot assignment in the AP (300tp).

Table 7-6: Tower AP base slot allocation

Slot type	Slot assignment
PCI-4	SCSI controller
PCI-3	Video card
PCI-2	Ethernet card (for connectivity to the MRS, IPML and/or for host connectivity)
PCI-1[a]	Ethernet card
ISA-PCI-10	CPU card
ISA-9	ISA slots 1-9 are used for a host connectivity card and/or Token Ring LAN card for connectivity to the MRS.
ISA-8	
ISA-PCI-7	
ISA-6	
ISA-5	
ISA-4	
ISA-3	
ISA-2	
ISA-1	

a. Used if customer orders a LAN card dedicated to IPML communications (optional).

Note: The AP (300tp) slots are numbered on the passive backplane next to each slot.

MRS/AP (300tp) slot assignment

The table below shows the slot assignment in the MRS/AP.

Table 7-7: MRS/AP base slot allocation

Slot type	Slot assignment
PCI-4	SCSI controller
PCI-3	Video card
PCI-2	Ethernet card (for connectivity to IPML and/or for host connectivity)
PCI-1[a]	Ethernet card
ISA-PCI-10	CPU card
ISA-9	ISA slots 1-9 are used for SCbus cards, host connectivity cards and/or Token Ring card to customer LAN.
ISA-8	
ISA-PCI-7	
ISA-6	
ISA-5	
ISA-4	
ISA-3	
ISA-2	
ISA-1	

a. Used if customer orders a LAN card dedicated to IPML communications (optional).

Note: The MRS/AP slots are numbered on the passive backplane next to each slot.

MRS/Tower (700tp) slot assignment

The table below shows the slot assignment in the MRS/Tower.

Table 7-8: MRS/Tower base slot allocation

Slot type	Slot assignment
PCI-3	Video card
PCI-2	Ethernet card (for connectivity to the AP)
PCI-1	Not used
ISA-PCI-17	CPU card
ISA-16	COM2 / PS/2 mouse connectors
ISA-15 to ISA-1	ISA slots 1-15 are used for SCbus cards and/or Token Ring LAN card for connectivity to the AP.

Note: The MRS/Tower slots are numbered on the passive backplane next to each slot.

AP (700tp) slot assignment

The table below shows the slot assignment in the AP (700tp).

Table 7-9: AP base slot allocation

Slot type	Slot assignment
PCI-3	Video card
PCI-2	Ethernet card (for connectivity to the MRS, IPML and/or for host connectivity)
PCI-1[a]	Ethernet card
ISA-PCI-17	CPU card
ISA-16	COM2 / PS/2 mouse connectors
ISA-15 to ISA-1	ISA slots 1-15 are used for a host connectivity card and/or Token Ring LAN card for connectivity to the MRS.

a. Used if customer orders a LAN card dedicated to IPML communications (optional).

Note: The AP slots are numbered on the passive backplane next to each slot.

MRS/AP (700tp) slot assignment

The table below shows the slot assignment in the MRS/AP (700tp).

Table 7-10: MRS/Tower base slot allocation

Slot type	Slot assignment
PCI-3	Video card
PCI-2	Ethernet card (for connectivity to IPML and/or for host connectivity)
PCI-1[a]	Ethernet card
ISA-PCI-17	CPU card
ISA-16	COM2 / PS/2 mouse connectors
ISA-15 to ISA-1	ISA slots 1-15 are used for SCbus cards, host connectivity cards and/or Token Ring card to customer LAN.

a. Used if customer orders a LAN card dedicated to IPML communications (optional).

Note: The MRS/AP slots are numbered on the passive backplane next to each slot.

MRS/Rack (1000rp) slot assignment

Table 7-11: MRS/Rack base slot allocation

Slot type	Slot assignment
PCI-3	Video card
PCI-2	Ethernet card (for connectivity to the AP)
PCI-1	Not used
ISA-PCI-17	CPU card
ISA-16	COM2 / PS/2 mouse connectors
ISA-15 to ISA-1	ISA slots 1-15 are used for SCbus cards and/or Token Ring LAN card for connectivity to the AP.

Note: The MRS/Rack slots are numbered on the passive backplane next to each slot.

Rack AP (1000rp) slot assignment

Table 7-12: Rack AP base slot allocation

Slot type	Slot assignment
PCI-3	Video card
PCI-2	Ethernet card (for connectivity to the MRS, IPML and/or for host connectivity)
PCI-1[a]	Ethernet card
ISA-PCI-17	CPU card
ISA-16	COM2 / PS/2 mouse connectors
ISA-15 to ISA-1	ISA slots 1-15 are used for a host connectivity card and/or Token Ring card to the MRS.

a. Used if customer orders a LAN card dedicated to IPML communications (optional).

Note: The Rack AP slots are numbered on the passive backplane next to each slot.

Chapter 8: System capacity

Capacity rules on R2 AP

Table 8-1: R2 AP capacity rules

Item	Capacity
Host connectivity	
3270 SNA over SDLC	1 board, 64 connections
3270 SNA over Token Ring	1 board, 254 connections
3270 TCP/IP over Ethernet or Token Ring	1 board, 254 connections
5250 SNA over SDLC	1 board, 64 connections
3250 SNA over Token Ring	1 board, 254 connections
5250 TCP/IP over Ethernet or Token Ring	1 board, 254 connections
VT100 over serial link	32 connections
Total number of host connectivity boards	1 per AP
Applications	
Number of user buffers	200
Size of user buffers	1920 characters per buffer
Maximum information databases	20 across all loaded applications
User functions	
Number of processes per user function	10
Number of input buffers	40

Item	Capacity
Number of output buffers	40
Size of input buffers	1920 characters per buffer
Size of output buffers	1920 characters per buffer
Number of entry points per user function (function codes)	100
RDBMS	
SQL database processes (concurrent transactions)	99 per AP
SQL database name	31 characters
Maximum number of concurrently running RDBMS clients	1
Telephony	
Number of MRSs per AP	4
Total number of voice ports controlled by one AP	192
Maximum number of ADSI sessions	192
WEB	
Number of WEB servers per AP	1
Number of WEB ports per AP	255
IPML	
Maximum number of IPML ports	192
Maximum number of Meridian Link applications (IPML, TAPI, etc.)	16 per Meridian Link module
Maximum IPML connections to Meridian Link modules	1 per AP
Remote access	
Maximum concurrent remote logins (may be limited by SCO license)	4

Item	Capacity
General	
EISA slots	6
PCI slots	2
RAM	min=64 Mbytes, max=96 Mbytes
Burst cache RAM	max=min=std=256 Kbytes
Maximum video RAM	max=min=std=1 Mbyte
Number of hard drives	2
Maximum number of mirrored disk pairs	1
Maximum hard drive capacity (per disk)	4.5 Gbytes[a]

a. Hard drives with 4.5 Gbytes or lower capacity can be used in the system only if they are among the hard drives on the list of supported hard drives.

Capacity rules on R2 MRS/AP

Table 8-2: R2 MRS/AP capacity rules

Item	Capacity	Max number of boards (per chassis)
Host connectivity		
3270 SNA over SDLC	1 board, 64 connections	
3270 SNA over Token Ring	1 board, 254 connections	
3270 TCP/IP over Ethernet or Token Ring	1 board, 254 connections	
5250 SNA over SDLC	1 board, 64 connections	
3250 SNA over Token Ring	1 board, 254 connections	
5250 TCP/IP over Ethernet or Token Ring	1 board, 254 connections	
VT100 over serial link	16 connections	
Total number of host connectivity boards	1 per MRS/AP	
Applications		
Number of user buffers	200	
Size of user buffers	1920 characters per buffer	
Maximum information databases	20 across all loaded applications	
User functions		
Number of processes per user function	10	
Number of input buffers	40	
Number of output buffers	40	
Size of input buffers	1920 characters per buffer	
Size of output buffers	1920 characters per buffer	

Item	Capacity	Max number of boards (per chassis)
Number of entry points per user function (function codes)	100	
RDBMS		
SQL database processes (concurrent transactions)	99 per MRS/AP	
SQL database name	31 characters	
Maximum number of concurrently running RDBMS clients	1	
WEB		
Number of WEB servers per MRS/AP	1	
Number of WEB ports per MRS/AP	255	
IPML		
Maximum number of IPML ports	96	
Maximum number of Meridian Link applications (IPML, TAPI, etc.)	16 per Meridian Link module	
Maximum IPML connections to Meridian Link modules	1 per MRS/AP	
Remote access		
Maximum concurrent remote logins (may be limited by SCO license)	4	
Telco boards		
LSI/120 (with D/121B)	36 ports	3 (6 total)
LSI/80 (with D/81A)	24	3 (6 total)

Item	Capacity	Max number of boards (per chassis)
D/41ESC	24	6
D/240SC-T1	96 ports[a]	4
Aculab E1 (30 port) (with D/320SC)	30 ports	1 (2 total)
Aculab E1 (60 port) (with D/320SC)	60 ports	1 (3 total)
VCS ASR on VR/160		
VCS ASR discrete speech recognition on VR160	32 ports	2
Number of VCS ASR discrete vocabularies on VR160	1 vocabulary per PEB 2 vocabularies per chassis	
VCS ASR continuous speech recognition on VR160	16 ports	2
Number of VCS ASR continuous vocabularies on VR 160	1 vocabulary per PEB 2 vocabularies per chassis	
Brooktrout fax		
Brooktrout fax ports	32 ports	5[b]
ADSI		
Maximum number of ADSI sessions	96	
Antares Voice Technologies (2000/50)[c]		
VCS ASR discrete speech recognition	4 ports per DSP, 48 ports per MRS/AP, 30 ports per PEB	4
Number of VCS ASR discrete vocabularies on Antares 2000/50	1 vocabulary per DSP	
VCS ASR continuous speech recognition	2 ports per DSP, 32 ports per MRS/AP, 16 ports per PEB	4

Item	Capacity	Max number of boards (per chassis)
Number of VCS ASR continuous vocabularies on Antares 2000/50	1 vocabulary per DSP	
PureSpeech ASR - Recite Continuous Digits	2 ports per DSP, 32 ports per MRS/AP, 16 ports per PEB	4
Number of PureSpeech ASR - Recite Lite Vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite Lite	2 ports per DSP, 32 ports per MRS/A, 16 ports per PEB	4
Number of PureSpeech ASR - Recite Lite Vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite Pro	2 ports per DSP, 32 ports per MRS/AP, 16 ports per PEB	4
Number of PureSpeech ASR - Recite Pro Vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite IQ	2 ports per DSP, 32 ports per MRS/AP, or 16 ports per PEB	4
Number of PureSpeech ASR - Recite IQ Vocabularies	1 vocabulary per board	
TruVoice TTS	2 ports per DSP, 32 ports per MRS/AP, 16 ports per PEB	4
Number of TruVoice TTS languages	1 language per board	
L&H TTS	6 ports per DSP, 48 ports per MRS/AP, 16 ports per PEB	2
Number of L&H TTS languages	2 languages per board	
Antares Voice Technologies (2000/33)[c]		
L&H TTS	4 ports per DSP, 48 ports per MRS/AP, 30 ports per PEB	

Item	Capacity	Max number of boards (per chassis)
PEB capacity limits		
Number of PEBs	2 (4 for T1)	
Number of cards per PEB	6	
Number of Fax cards per PEB	5[b]	
Number of VR160 cards per PEB	2	
Number of Antares cares per PEB	2	
Number of option cards per PEB	5	
Number of telco ports per PEB	24/32 (mu-law/A-law)	
General		
EISA slots	6	
PCI slots	2	
RAM (minimum/maximum)	min=64 Mbytes, max=96 Mbyte	
Burst cache RAM	min=max=std=256 Kbytes	
Maximum video RAM	min=max=std=1 Mbyte	
Maximum number of VSN volumes	min=max=std=4	
Max VSNs per VSN volume	13824	
Number of hard drives	2	
Maximum number of mirrored disk pairs	1	
Maximum hard drive capacity (per disk)	4.5 Gbytes[d]	

a. Performance of high capacity MRS/AP systems with 72 or 96 ports is dependent on call arrival distribution and IVR application specifics. Performance degradation can occur under unfavorable conditions.

b. Maximum number of Brooktrout fax ports is 32, provided the number of fax cards does not exceed the number of available slots, and the number of fax ports does not exceed the number of available time slots on the PEB.
c. Antares cards have 4 DSPs per card.
d. Hard drives with 4.5-Gbyte or lower capacity can be used in the system only if they are among the hard drives on the list of supported hard drives.

Capacity rules on R2 MRS/Tower and R2 MRS/Rack

Table 8-3: R2 MRS/Tower and R2 MRS/Rack capacity rules

Item	Capacity	Max number of boards
Telco boards[a]		
LSI/120 (with D/121B)	48 ports	4 (8 total)
LSI/80 (with D/81B)	48 ports	6 (12 total)
D/41ESC	48 ports	12
D/240SC-T1	48 ports	2
Aculab E1 (30 ports) (with D/320SC)	30 ports	1 (2 total)
Aculab E1 (60 ports) (with D/320SC)	60 ports	1 (3 total)
VCS ASR on VR/160		
VCS ASR discrete speech recognition on VR 160	32 ports	2
Number of VCS ASR discrete vocabularies on Antares 2000/50	1 vocabulary per PEB, 2 vocabularies per chassis	
VCS ASR continuous speech recognition on VR 160	16 ports	2
Number of VCS ASR continuous vocabularies on VR/160	1 vocabulary per PEB, 2 vocabularies per chassis	
Brooktrout fax		
Brooktrout fax ports	32 ports[b]	
Antares Voice Technologies (2000/50)[c]		
VCS ASR discrete speech recognition	4 ports per DSP, 60 ports per MRS/AP, 30 ports per PEB	4
Number of VCS ASR discrete vocabularies on Antares 2000/50	1 vocabulary per PEB	

Item	Capacity	Max number of boards
VCS ASR continuous speech recognition	2 ports per DSP, 32 ports per MRS/AP, 16 ports per PEB	4
Number of VCS ASR continuous vocabularies on Antares 2000/50	1 vocabulary per DSP	
TruVoice TTS	2 ports per DSP, 40 ports per MRS/AP, 16 ports per PEB	4
Number of TruVoice TTS languages	1 language per board	
L&H TTS	6 ports per DSP, 60 ports per MRS/AP, 30 ports per PEB	3
Number of L&H TTS languages	2 languages per board	
Antares Voice Technologies (2000/50)[d]		
L&H TTS	4 ports per DSP, 48 ports per MRS, 30 ports per PEB	3
PEB capacity limits		
Number of PEBs	2	
Number of cards per PEB	10	
Number of Fax cards per PEB	5[e]	
Number of VR 160 cards per PEB	2	
Number of Antares cards per PEB	2	
Number of option cards per PEB	5	
Number of telco ports per PEB	24 / 32 (mu-law/A-law)	

Item	Capacity	Max number of boards
General		
RAM	min=max=std=32 Mbytes	
Maximum video RAM	min=max=std=1 Mbyte	
Maximum number of VSN volumes per MRS	4	
Max VSNs per VSN volume	13824	
Number of hard drives	4	
Maximum number of mirrored disk pairs	1	
Maximum hard drive capacity (per disk)	1.0 Gbyte [f]	

a. Performance of high capacity MRS systems with greater than 24 ports is dependent on call arrival distribution and IVR application specifics. Performance degradation can occur under unfavorable conditions.

b. Maximum number of Brooktrout fax ports is 32, provided the number of fax cards does not exceed the number of available slots, and the number of fax ports does not exceed the number of available time slots on the PEB.

c. Hard drives (with 1 Gbyte capacity) can be used in the system only if they are among the hard drives on the list of supported hard drives.

d. Hard drives (with 1 Gbyte capacity) can be used in the system only if they are among the hard drives on the list of supported hard drives.

e. Hard drives (with 1 Gbyte capacity) can be used in the system only if they are among the hard drives on the list of supported hard drives.

f. Hard drives (with 1 Gbyte capacity) can be used in the system only if they are among the hard drives on the list of supported hard drives.

Capacity rules on Tower AP (300tp)

Table 8-4: Tower AP capacity rules

Item	Capacity
Host connectivity	
3270 SNA over SDLC	1 board, 64 connections
3270 SNA over Token Ring	1 board, 254 connections
3270 TCP/IP over Ethernet or Token Ring	1 board, 254 connections
5250 SNA over SDLC	1 board, 64 connections
3250 SNA over Token Ring	1 board, 254 connections
5250 TCP/IP over Ethernet or Token Ring	1 board, 254 connections
VT100 over serial link	32
Total number of host connectivity boards	1 per AP
Applications	
Number of user buffers	200
Size of user buffers	1920 characters per buffer
Maximum information databases	20 across all loaded applications
User functions	
Number of processes per user function	10
Number of input buffers	40
Number of output buffers	40
Size of input buffers	1920 characters per buffer
Size of output buffers	1920 characters per buffer
Number of entry points per user function (function codes)	100

Item	Capacity
RDBMS	
SQL database processes (concurrent transactions)	99 per AP
SQL database name	31 characters
Maximum number of concurrently running RDBMS clients	1
Telephony	
Number of MRSs per AP	4
Total number of voice ports controlled by one AP	192
ADSI	
Maximum number of ADSI sessions controlled by AP.	192
WEB	
Number of WEB servers per AP	1
Number of WEB ports per AP	255
IPML	
Maximum number of IPML ports	192
Maximum number of Meridian Link applications (IPML, TAPI, etc.)	16 per Meridian Link module
Maximum IPML connections to Meridian Link modules	1 per AP
Remote access	
Maximum concurrent remote logins (may be limited by SCO license)	4
General	
ISA slots	9
PCI slots	4

Item	Capacity
CPU slot	1
RAM	min=64 Mbytes, max=192 Mbytes
Maximum cache RAM	min=max=std=256 kbytes
Maximum video RAM	min=max=std=2 Mbytes
Number of hard drives	2
Maximum number of mirrored disk pairs	1
Maximum hard drive capacity (per disk)	4.5 Gbytes[a]

a. Hard drives with 4.5 Gbytes or lower capacity can be used in the system only if they are among the hard drives on the list of supported hard drives.

Capacity rules on MRS/AP (300tp)

Table 8-5: MRS/AP capacity rules

Item	Capacity	Max number of boards
Host connectivity		
3270 SNA over SDLC	1 board, 64 connections	
3270 SNA over Token Ring	1 board, 254 connections	
3270 TCP/IP over Ethernet or Token Ring	1 board, 254 connections	
5250 SNA over SDLC	1 board, 64 connections	
3250 SNA over Token Ring	1 board, 254 connections	
5250 TCP/IP over Ethernet or Token Ring	1 board, 254 connections	
VT100 over serial link	32	
Total number of host connectivity boards	1 per MRS/AP	
Applications		
Number of user buffers	200	
Size of user buffers	1920 characters per buffer	
Maximum information databases	20 across all loaded applications	
User functions		
Number of processes per user function	10	
Number of input buffers	40	
Number of output buffers	40	
Size of input buffers	1920 characters per buffer	
Size of output buffers	1920 characters per buffer	
Number of entry points per user function (function codes)	100	

Item	Capacity	Max number of boards
RDBMS		
SQL database processes (concurrent transactions)	99 per AP	
SQL database name	31 characters	
Maximum number of concurrently running RDBMS clients	1	
WEB		
Number of WEB servers per MRS/AP	1	
Number of WEB ports per MRS/AP	255	
IPML		
Maximum number of IPML ports	96	
Maximum number of Meridian Link applications (IPML, TAPI, etc.)	16 per Meridian Link module	
Maximum IPML connections to Meridian Link modules	1 per MRS/AP	
Remote access		
Maximum concurrent remote logins (may be limited by SCO license)	4	
Telco boards		
D/41ESC	36 ports	9
D/160SC-LS	64ports	4
D/240SC-T1	96 ports	4
Aculab E1 (30 port) (with D/320SC)	60 ports	2 (4 total)
Aculab E1 (60 port) (with D/320SC)	90 ports	2 (6 total)

Item	Capacity	Max number of boards
ADSI		
Maximum number of ADSI sessions	96	
GammaLink Fax[a]		
CP/4-SC	28 ports	7
CP/6-SC	42 ports	7
CP/12-SC	60 ports	5
Antares Voice Technologies (2000/50)[b]		
VCS ASR discrete speech recognition	4 ports per DSP, 64 ports per MRS/AP	4
Number of VCS ASR discrete vocabularies	1 vocabulary per DSP	
VCS ASR continuous speech recognition	2 ports per DSP, 48 ports per MRS/AP	6
Number of VCS ASR continuous vocabularies	1 vocabulary per DSP	
PureSpeech ASR - Recite Continuous Digits	2 ports per DSP, 48 ports per MRS/AP	6
Number of PureSpeech ASR - Recite Continuous Digits vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite Lite	2 ports per DSP, 48 ports per MRS/AP	6
Number of Purespeech ASR - Recite Lite vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite Pro	2 ports per DSP, 48 ports per MRS/AP	6
Number of Purespeech ASR - Recite Pro vocabularies	1 vocabulary per board	
Purespeech ASR - Recite IQ	2 ports per DSP, 48 ports per MRS/AP	6
Number of Purespeech ASR - Recite IQ vocabularies	1 vocabulary per board	
TruVoice TTS	2 ports per DSP, 48 ports per MRS/AP	6

Item	Capacity	Max number of boards
Number of TruVoice TTS languages	1 language per board	
L&H TTS	6 ports per DSP, 64 ports per MRS/AP	3
Number of L&H TTS languages	2 languages per board	3
SCbus		
Number of SCbus transmit timeslots	1024	
General		
ISA slots	9	
PCI slots	4	
CPU slot	1	
RAM	min=64 Mbytes, max=192 Mbytes	
Maximum cache RAM	min=max=std=256 kbytes	
Maximum video RAM	min=max=std=2 Mbytes	
Maximum number of VSN volumes	min=max=std=44	
Max VSNs per VSN volume	13824	
Number of hard drives	2	
Maximum number of mirrored disk pairs	1	
Maximum hard drive capacity (per disk)	4.5 Gbytes[c]	

a. See Chapter 5, "System configuration," for rules on combining different GammaLink board types.

b. Antares cards have four DSPs per card.

c. Hard drives with 4.5-Gbyte capacity can be used in the system only if they are among the hard drives on the list of supported hard drives.

Capacity rules on AP (700tp)

Table 8-6: AP (700tp) capacity rules

Item	Capacity	Max number of boards
Host connectivity		
3270 SNA over SDLC	1 board, 64 connections	
3270 SNA over Token Ring	1 board, 254 connections	
3270 TCP/IP over Ethernet or Token Ring	1 board, 254 connections	
5250 SNA over SDLC	1 board, 64 connections	
3250 SNA over Token Ring	1 board, 254 connections	
5250 TCP/IP over Ethernet or Token Ring	1 board, 254 connections	
VT100 over serial link	32	
Total number of host connectivity boards	1 per AP	
Applications		
Number of user buffers	200	
Size of user buffers	1920 characters per buffer	
Maximum information databases	20 across all loaded applications	
User functions		
Number of processes per user function	10	
Number of input buffers	40	
Number of output buffers	40	
Size of input buffers	1920 characters per buffer	
Size of output buffers	1920 characters per buffer	
Number of entry points per user function (function codes)	100	

Item	Capacity	Max number of boards
RDBMS		
SQL database processes (concurrent transactions)	99 per AP	
SQL database name	31 characters	
Maximum number of concurrently running RDBMS clients	1	
Telephony		
Number of MRSs per AP	4	
Total number of voice ports controlled by one AP	256	
Maximum number of ADSI sessions	256	
WEB		
Number of WEB servers per AP	1	
Number of WEB ports per AP	255	
IPML		
Maximum number of IPML ports	256	
Maximum number of Meridian Link applications (IPML, TAPI, etc.)	16 per Meridian Link module	
Maximum IPML connections to Meridian Link modules	1 per AP	9
Remote access		
Maximum concurrent remote logins (may be limited by SCO license)	4	4

Item	Capacity	Max number of boards
General		
ISA slots	16 (Slot 16 reserved for i/O)	
PCI slots	3	
CPU slot	1	
RAM (base/maximum)	min=64 Mbytes, max=256 Mbytes	
Maximum cache RAM	min=max=std=512 kbytes	
Maximum video RAM	2 Mbytes	
Number of hard drives	2	
Maximum number of mirrored disk pairs	1	
Maximum hard drive capacity (per disk)	4.5 Gbytes[a]	

a. Hard drives with 4.5-Gbyte capacity can be used in the system only if they are among the hard drives on the list of supported hard drives.

Capacity rules on MRS/AP (700tp)

Table 8-7: MRS/AP (700tp) capacity rules

Item	Capacity	Max number of boards
Host connectivity		
3270 SNA over SDLC	1 board, 64 connections	
3270 SNA over Token Ring	1 board, 254 connections	
3270 TCP/IP over Ethernet or Token Ring	1 board, 254 connections	
5250 SNA over SDLC	1 board, 64 connections	
3250 SNA over Token Ring	1 board, 254 connections	
5250 TCP/IP over Ethernet or Token Ring	1 board, 254 connections	
VT100 over serial link	32	
Total number of host connectivity boards	1 per MRS/AP	
Applications		
Number of user buffers	200	
Size of user buffers	1920 characters per buffer	
Maximum information databases	20 across all loaded applications	
User functions		
Number of processes per user function	10	
Number of input buffers	40	
Number of output buffers	40	
Size of input buffers	1920 characters per buffer	
Size of output buffers	1920 characters per buffer	
Number of entry points per user function (function codes)	100	

Item	Capacity	Max number of boards
RDBMS		
SQL database processes (concurrent transactions)	99 per AP	
SQL database name	31 characters	
Maximum number of concurrently running RDBMS clients	1	
WEB		
Number of WEB servers per MRS/AP	1	
Number of WEB ports per MRS/AP	255	
IPML		
Maximum number of IPML ports	96	
Maximum number of Meridian Link applications (IPML, TAPI, etc.)	16 per Meridian Link module	
Maximum IPML connections to Meridian Link modules	1 per MRS/AP	
Remote access		
Maximum concurrent remote logins (may be limited by SCO license)	4	
Telco boards		
D/41ESC	36 ports	9
D/160SC-LS	64ports	4
D/240SC-T1	96 ports	4
Aculab E1 (30 port) (with D/320SC)	60 ports	2 (4 total)
Aculab E1 (60 port) (with D/320SC)	90 ports	2 (6 total)

Item	Capacity	Max number of boards
ADSI		
Maximum number of ADSI sessions	96	
GammaLink Fax[a]		
CP/4-SC	28 ports	
CP/6-SC	42 ports	
CP/12-SC	60 ports	
Antares Voice Technologies (2000/50)[b]		
VCS ASR discrete speech recognition	4 ports per DSP, 64 ports per MRS/AP	4
Number of VCS ASR discrete vocabularies	1 vocabulary per DSP	
VCS ASR continuous speech recognition	2 ports per DSP, 64 ports per MRS/AP	6
Number of VCS ASR continuous vocabularies	1 vocabulary per DSP	
PureSpeech ASR - Recite Continuous Digits	2 ports per DSP, 64 ports per MRS/AP	6
Number of Purespeech ASR - Recite Continuous Digits vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite Lite	2 ports per DSP, 64 ports per MRS/AP	6
Number of Purespeech ASR - Recite Lite vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite Pro	2 ports per DSP, 64 ports per MRS/AP	6
Number of Purespeech ASR - Recite Pro vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite IQ	2 ports per DSP, 64 ports per MRS/AP	6

Item	Capacity	Max number of boards
Number of Purespeech ASR - Recite IQ vocabularies	1 vocabulary per board	
TruVoice TTS	2 ports per DSP, 60 ports per MRS/AP	6
Number of TruVoice TTS languages	1 language per board	
L&H TTS	6 ports per DSP, 64 ports per MRS/AP	3
Number of L&H TTS languages	2 languages per board	
SCbus		
Number of SCbus transmit timeslots	1024	
General		
ISA slots	16 (Slot 16 reserved for I/O)	
PCI slots	3	
CPU Slot	1	
RAM	min=64 Mbytes, max=256 Mbytes	
Maximum cache RAM	min=max=std=512 kbytes	
Maximum video RAM	2 Mbytes	
Maximum number of VSN volumes per MRS	min=max=std=4	
Max VSNs per VSN volume	13824	
Number of hard drives	2	
Maximum number of mirrored disk pairs	1	
Maximum hard drive capacity (per disk)	4.5 Gbytes[c]	

a. See Chapter 5, “System configuration,” for rules on combining different GammaLink board types.

b. Antares cards have four DSPs per card.

c. Hard drives with 4.5-Gbyte or lower capacity can be used in the system only if they are among the hard drives on the list of supported hard drives.

Capacity rules on MRS/Tower (700tp)

Table 8-8: MRS/Tower capacity rules

Item	Capacity	Max number of boards
Telco boards		
D/41ESC	60 ports	15
D/160SC-LS	96 ports[a]	6
D/240SC-T1	120 ports[a]	5
Aculab E1 (30 port) (with D/320SC)	60 ports[a]	2 (4 total)
Aculab E1 (60 port) (with D/320SC)	120 ports[a]	2 (6 total)
GammaLink Fax[b]		
CP/4-SC	32	8
CP/6-SC	48	8
CP/12-SC	60	5
Antares Voice Technologies (2000/50)[c]		
VCS ASR discrete speech recognition	4 ports per DSP, 64 ports per MRS/AP	4
Number of VCS ASR discrete vocabularies	1 vocabulary per DSP	
VCS ASR continuous speech recognition	2 ports per DSP, 64 ports per MRS/AP	8
Number of VCS ASR continuous vocabularies	1 vocabulary per DSP	
PureSpeech ASR - Recite Continuous Digits	2 ports per DSP, 64 ports per MRS/AP	8
Number of Purespeech ASR - Recite Continuous Digits vocabularies	1 vocabulary per board	

Item	Capacity	Max number of boards
PureSpeech ASR - Recite Lite	2 ports per DSP, 64 ports per MRS/AP	8
Number of Purespeech ASR - Recite Lite vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite Pro	2 ports per DSP, 64 ports per MRS/AP	8
Number of Purespeech ASR - Recite Pro vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite IQ	2 ports per DSP, 64 ports per MRS/AP	8
Number of Purespeech ASR - Recite IQ vocabularies	1 vocabulary per board	
TruVoice TTS	2 ports per DSP, 60 ports per MRS/AP	8
Number of TruVoice TTS languages	1 language per board	
L&H TTS	6 ports per DSP, 64 ports per MRS/AP	3
Number of L&H TTS languages	2 languages per board	
SCbus		
Number of SCbus transmit timeslots	1024	
General		
ISA slots	16 (Slot 16 reserved for I/O)	
PCI slots	3	
CPU Slot	1	
RAM (base/maximum)	min=64 Mbytes, max=256 Mbytes	
Maximum cache RAM	min=max=std=512 kbytes	
Maximum video RAM	2 Mbytes	
Maximum number of VSN volumes per MRS	min=max=std=4	

Item	Capacity	Max number of boards
Max VSNs per VSN volume	13824	
Number of hard drives	2	
Maximum number of mirrored disk pairs	1	
Maximum hard drive capacity (per disk)	4.5 Gbytes[d]	

a. Performance of high capacity MRS/AP systems with 120 ports is dependent on call arrival distribution and IVR application specifics. Performance degradation can occur under unfavorable conditions.

b. See Chapter 5 for rules on combining different GammaLink board types.

c. Antares cards have four DSPs per card.

d. Hard drives with 4.5-Gbyte or lower capacity can be used in the system only if they are among the hard drives on the list of supported hard drives.

Capacity rules on MRS/Rack (1000rp)

Table 8-9: MRS/Rack capacity rules

Item	Capacity	Max number of boards
Telco boards		
D/41ESC	60	15
D/160SC-LS	64 ports[a]	4
D/240SC-T1	120 ports[a]	5
Aculab E1 (30 port) (with D/320SC)	60 ports[a]	2 (4 total)
Aculab E1 (60 port) (with D/320SC)	120 ports[a]	2 (6 total)
ADSI		
Maximum number of ADSI sessions	Number of voice ports driven by the MRS	
GammaLink Fax[b]		
CP/4-SC	32	8
CP/6-SC	48	8
CP/12-SC	60	5
Antares Voice Technologies (2000/50)[c]		
VCS ASR discrete speech recognition	4 ports per DSP, 64 ports per MRS	4
Number of VCS ASR discrete vocabularies	1 vocabulary per DSP	
VCS ASR continuous speech recognition	2 ports per DSP, 64 ports per MRS	8
Number of VCS ASR continuous vocabularies	1 vocabulary per DSP	

Item	Capacity	Max number of boards
PureSpeech ASR - Recite Continuous Digits	2 ports per DSP, 64 ports per MRS	8
Number of Purespeech ASR - Recite Continuous Digits vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite Lite	2 ports per DSP, 64 ports per MRS	8
Number of Purespeech ASR - Recite Lite vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite Pro	2 ports per DSP, 64 ports per MRS	8
Number of Purespeech ASR - Recite Pro vocabularies	1 vocabulary per board	
PureSpeech ASR - Recite IQ	2 ports per DSP, 64 ports per MRS	8
Number of Purespeech ASR - Recite IQ vocabularies	1 vocabulary per board	
TruVoice TTS	2 ports per DSP, 64 ports per MRS	8
Number of TruVoice TTS languages	1 language per board	
L&H TTS	6 ports per DSP, 64 ports per MRS	3
Number of L&H TTS languages	2 languages per board	
SCbus		
Number of SCbus transmit timeslots	1024	
General		
ISA slots	16 (Slot 16 reserved for I/O)	
PCI slots	3	
RAM (base/maximum)	min=64 Mbytes, max=256 Mbytes	
Maximum cache RAM	min=max=std=512 kbytes	

Item	Capacity	Max number of boards
Maximum video RAM	2 Mbytes	
Maximum number of VSN volumes per MRS	min=max=std=4	
Max VSNs per VSN volume	13824	
Number of hard drives	4	
Maximum number of mirrored disk pairs	1	
Maximum hard drive capacity (per disk)	4.5 Gbytes[d]	

a. MRS/Rack with four D/160SC-LS boards cannot have more than a combined total of four Antares and/or GammaLink fax boards.

b. Performance of high capacity MRS systems with 120 ports is dependent on cell arrival distribution and IVR application specifics. Performance degradation can occur under unfavorable conditions.

c. See Chapter 5, "System configuration," for rules on combining different GammaLink board types.

d. Antares cards have four DSPs per card.

e. Hard drives (with a 4.5-Gbyte capacity) can be used in the system only if they are among the hard drives on the list of supported hard drives.

Capacity rules on Rack AP (1000rp)

Table 8-10: Rack AP capacity rules

Item	Capacity
Host connectivity	
3270 SNA over SDLC	1 board, 64 connections
3270 SNA over Token Ring	1 board, 254 connections
3270 TCP/IP over Ethernet or Token Ring	1 board, 254 connections
5250 SNA over SDLC	1 board, 64 connections
3250 SNA over Token Ring	1 board, 254 connections
5250 TCP/IP over Ethernet or Token Ring	1 board, 254 connections
VT100 over serial link	32
Total number of host connectivity boards	1 per AP
Applications	
Number of user buffers	200
Size of user buffers	1920 characters per buffer
Maximum information databases	20 across all loaded applications
User functions	
Number of processes per user function	10
Number of input buffers	40
Number of output buffers	40
Size of input buffers	1920 characters per buffer
Size of output buffers	1920 characters per buffer
Number of entry points per user function (function codes)	100

Item	Capacity
RDBMS	
SQL database processes (concurrent transactions)	99 per AP
SQL database name	31 characters
Maximum number of concurrently running RDBMS clients	1
Telephony	
Number of MRSs per AP	4
Total number of voice ports controlled by one AP	256
Maximum number of ADSI sessions	256
WEB	
Number of WEB servers	1
Number of WEB ports	255
IPML	
Maximum number of IPML ports	256
Maximum number of Meridian Link applications (IPML, TAPI, etc.)	16 per Meridian Link module
Maximum IPML connections to Meridian Link modules	1 per AP
Remote access	
Maximum concurrent remote logins (may be limited by SCO license)	4

Item	Capacity
General	
ISA slots	16 (Slot 16 reserved for I/O)
PCI slots	3
CPU slot	1
RAM (base/maximum)	min=64 Mbytes, max=256 Mbytes
Maximum cache RAM	min=max=std=512 Kbytes
Maximum video RAM	2 Mbytes
Number of hard drives	2
Maximum number of mirrored disk pairs	1
Maximum hard drive capacity (per disk)	4.5 Gbytes[a]

a. Hard drives with 4.5-Gbyte capacity can be used in the system only if they are among the hard drives on the list of supported hard drives.

Chapter 9: System limitations

Table 9-1 on page 9-1 shows the limitations matrix for Symposium OPEN IVR 4.0 on Release 4 hardware.

Table 9-2 on page 9-3 shows the limitations matrix for Symposium OPEN IVR 4.0 on Release 2 hardware.

Table 9-1: Limitations matrix for Symposium OPEN IVR 4.0 on the Release 4 hardware

Resource	Tower AP (300tp 700tp)	MRS/ AP (300tp 700tp)	MRS/ Tower (700tp)	Rack AP (1000rp)	MRS/ Rack (1000rp)
Local printer	no	no	no	no	no
Redundant AP	yes	no	N/A	yes	N/A
Simultaneous development and runtime system	yes[a]	yes[b]	N/A	yes[c]	N/A
Multiple host boards (same type)	no	no	N/A	no	N/A
Multiple host boards (different type)	no	no	N/A	no	N/A
32 Mbyte SIMMs	no	no	no	no	no
AIU supported on systems with digital telco interfaces	N/A	no	no	N/A	no
Separate PEBs can share Fax, TTS and VR ports	N/A	N/A	N/A	N/A	N/A
Multiple vendors per Antares card	N/A	no	no	N/A	no
Additional RAM can be added to the standard system	yes	yes	yes	yes	yes

Resource	Tower AP (300tp 700tp)	MRS/ AP (300tp 700tp)	MRS/ Tower (700tp)	Rack AP (1000rp)	MRS/ Rack (1000rp)
Simultaneous use of different telco interfaces	N/A	no	no	N/A	no
Simultaneous use of different sized disks	no	no	no	no	no
Must use gold SIMMs	no/yes	no/yes	yes	yes	yes
VCS/VR160 ASR	N/A	no	no	N/A	no
Antares 2000/33	N/A	no	no	N/A	no
Multiple Telco interface boards	N/A	no	no	N/A	no
TTS, UPS and Token Ring LAN co-existence	N/A	yes	yes	N/A	yes
VR160, Aculab and Digi PC/Xem co-existence	N/A	N/A	N/A	N/A	N/A
Support modems of 14.4 Kbps or faster	yes	yes	yes	yes	yes
PCI cards can share IRQs	yes	yes	yes	yes	yes
ISA cards of different type can share IRQs	no	no	no	no	no
Support of 3270 and/or 5250 TCP/IP over Token Ring	no	no	N/A	no	N/A
Maximum CPU speed (Mhz)	233	233	233	233	233

a. Not recommended
b. Not recommended
c. Not recommended

Table 9-2: Limitations Matrix for Symposium OPEN IVR 4.0 on the Release 2 hardware

Resource	R2 AP	R2 MRS/AP	R2 MRS/Tower, R2 MRS/Rack
Local printer	no	no	no
Redundant AP	yes	N/A	N/A
Simultaneous development and runtime system	yes[a]	yes[b]	N/A
Multiple host boards (same type)	no	no	N/A
Multiple host boards (different type)	no	no	N/A
32 Mbyte SIMMs	no	no	no
AIU supported on systems with digital telco interfaces	N/A	no	no
Separate PEBs can share Fax, TTS and VR ports	no	no	no
Multiple vendors per Antares card	N/A	no	no
Additional RAM can be added to the standard system	yes	yes	no
Simultaneous use of different telco interfaces	N/A	no	no
Simultaneous use of different sized disks	no	no	no
Must use gold SIMMs	no	no	no
VCS/VR160 ASR	N/A	yes	yes
Antares 2000/33	N/A	yes	yes
Multiple Telco interface boards	N/A	no	no
TTS, UPS and Token Ring LAN co-existence	N/A	no	yes

Resource	R2 AP	R2 MRS/AP	R2 MRS/Tower, R2 MRS/Rack
VR160, Aculab and Digi PC/Xem co-existence	N/A	no	yes
Support modems of 14.4 Kbps or faster	yes	yes	no
PCI cards can share IRQs	yes	yes	N/A
ISA cards of different type can share IRQs	no	no[c]	no[d]
Support of 3270 and/or 5250 TCP/IP over Token Ring	no	no	N/A
Maximum CPU speed (Mhz)	133	133	66

a. Not recommended
b. Not recommended
c. Except for the D/81 and VR160 or D/121 and VR160
d. Except for the D/81 and VR160 or D/121 and VR160

Chapter 10: Performance considerations

Factors affecting system performance

Factors affecting system performance are imposed by a combination of the system limits and the nature of the running applications. It is recommended that the IVR applications be designed such that the response time is less than one second. Thus the system should respond with voice within one second after a DTMF digit or string of digits are entered.

Host access

This is a factor which is not directly related to IVR performance, but to the performance of the remote host and the quality of communications between the two machines. If host access is going to be longer than one second, it is recommended that the application play voice while the access is occurring.

LAN connection between AP and MRS

AP and MRS should be on the same LAN. This means there should not be any LAN bridges or gateways between the AP and MRS. The throughput of an Ethernet LAN is highest with small traffic (minimum number of packet collisions), but deteriorates rapidly as traffic on the LAN increases. On the other hand, a Token Ring LAN has worse performance than Ethernet under lower traffic, but maintains a steady performance under heavy traffic.

The AP and MRS do not need to be on a dedicated LAN. But it is recommended that IVR be on a dedicated LAN if the traffic on the already existent LAN is high. A lot of traffic on the LAN can significantly reduce the performance of the IVR system.

Chapter 11: Traffic and engineering principles

Traffic model

The traffic model used by an IVR system is dependent on how the front-end switch treats incoming calls. The IVR system provides a finite number of channels on which calls can be processed. If all the channels are busy, the switch can either block any other calls destined for the IVR system or it can queue up the calls. The latter model is used by all OPEN IVR systems fronted by a PBX and by systems fronted by a CO switch using Universal Call Distribution (UCD) or Automatic Call Distribution (ACD) queues. Calls are blocked for systems fronted by a CO switch using the Multi-Line Hunt Group. A PBX can also block calls by equating the number of incoming IVR trunks to the number of IVR channels.

Hold times

Holding time is an important concept in the traffic model. It includes the following:

- the time required to establish the call (e.g. dialing and ringing)
- the time the resource is held (e.g. conversation time)
- the time required to disconnect the call (e.g. take the connection down)

Holding time is dependent on the resource being used. For example, if an application answers a call, does a Text-To-Speech operation, then disconnects the caller, there are 2 holding times to consider: the holding time of the entire call and the holding time of the Text-To-Speech channel. The holding time of the entire call will influence the total number of IVR ports needed on the system while the holding time of the Text-To-Speech channel will only influence the total number of Text-To-Speech channels needed on the IVR system.

Target Grade of Service

The Grade of Service (GOS) is simply the probability that a caller is queued beyond a certain amount of time, or the probability that a caller is blocked. A number of factors affect the Grade of Service:

1 The call volume, e.g. the number of calls in a busy hour.

2 The average length of the calls (hold time).

3 The number of ports available to service these calls.

4 Whether the ports are dedicated or shared.

Factors 1 and 2 together make up the traffic intensity, also known as the call capacity. For example if an application expects 100 calls in the busy hour and each call lasts an average of 2 minutes, then the call capacity on that application is 100*120 seconds, which is 12,000 call seconds or 120 centi-call seconds (120 ccs).

In a queueing traffic model, the recommended GOS is a 5% probability that the delay in the queue will exceed one ring cycle. This is known as a P.05 GOS. One ring cycle is approximately 6 seconds.

In a blocking traffic model, the recommended GOS is a 2% probability that a caller will be blocked. This is a P.02 GOS.

For resources other than the IVR ports, the target GOS or tolerable delay may be different.

Target Symposium OPEN IVR 4.0 response times

While the GOS is not directly dependent on Symposium OPEN IVR 4.0 CPU power, the response time is. In addition, if external factors like 3270 hosts are present, the response time becomes dependent on their response characteristics as well.

However, there is one response time which is always dependent on Symposium OPEN IVR 4.0. This is the time between when a caller finishes entering DTMF input and when the system responds by playing a prompt. This time should be less than 2 seconds 95% of the time and should average under 1 second. This target should be met even if the response time includes local data retrieval.

Traffic capacity tables

If a traffic model is non-blocking, the Erlang-C formula is used. If the traffic model is blocking, the Erlang-B formula is used.

Figure 11-1: Erlang-B and Erlang-C formulas

$$\text{ErlangB}(A,N) = \frac{A^N}{\left(\sum_{j=0}^{N} \frac{A^j}{j!}\right) * N!}$$

$$\text{ErlangC}(A,N,H,D) = \frac{A^N}{\left(\sum_{j=0}^{N-1} \frac{A^j}{j!}\right) * \left(1 - \frac{A}{N}\right) * N! + A^N} * e^{-(N-A)D/H}$$

where

A = Total traffic offered in erlangs, where an erlang is 60 minutes or 36 CCS of use per busy hour
N = Number of ports
Erlang(B,C)(...) = Probability of delay or blocking
H = Total hold time (seconds)

The following tables give the call capacity which can be supported by a given number of channels for a given average session length or hold time of the port.

Table 11-1 specifies the call capacity that can be handled by a specified number of IVR ports in a queueing traffic model. This traffic volume is based on an Erlang-C distribution with a 5% probability that the wait time will exceed one ring cycle or 6 seconds. The results in an Erlang-C calculation depend only on the ratio of the tolerable delay to the total hold time. For a P.05 GOS, the tolerable delay (D) is equivalent to one ring cycle or 6 seconds. Assuming the hold time is equal to the session length, then for a session length of 120 seconds, the ratio of tolerable delay over hold time (D/H) is equal to 0.05. This ratio is indicated by r in the tables.

Table 11-2 specifies the call capacity that can be handled by a specified number of IVR ports in a blocking traffic model. This traffic volume is based on an Erlang-B distribution with a 2% probability of call blocking.

Table 11-3 specifies the call capacity based on an Erlang-C distribution with a 1% probability that the wait time will exceed 2 seconds. The ratio of tolerable delay over hold time (D/H) is indicated by r in the table. This table is used in the Text-To-Speech and Speech Recognition port sizing examples in Chapter 12, "System sizing.

Table 11-1: Erlang-C traffic capacity (CCS) at P.05

No. of ports	60s sessions r=0.1	120s sessions r=0.05	180s sessions r=0.03	300s sessions r=0.02
4	51.5	49.5	48.7	48.3
8	150.5	144.9	142.7	141.6
12	262.2	252.9	249.1	247.2
16	380.4	367.4	362.0	359.2
20	502.6	486.0	478.9	475.3
24	627.7	607.4	598.7	594.3
28	754.9	731.1	720.8	715.5
32	883.8	856.5	844.5	838.3
36	1014.0	983.2	969.7	962.6

No. of ports	60s sessions r=0.1	120s sessions r=0.05	180s sessions r=0.03	300s sessions r=0.02
40	1145.4	1111.2	1096.0	1088.1
44	1277.6	1240.1	1223.4	1214.6
48	1410.7	1369.9	1351.6	1342.0
52	1544.5	1500.5	1480.6	1470.1
56	1678.9	1631.7	1610.2	1598.9
60	1813.8	1763.5	1740.5	1728.3
64	1949.2	1895.8	1871.3	1858.2
68	2085.0	2028.7	2002.5	1988.7
72	2221.2	2161.9	2134.3	2119.5
76	2357.8	2295.6	2266.4	2250.8
80	2494.7	2429.6	2398.9	2382.5
84	2631.9	2563.9	2531.8	2514.5
88	2769.4	2698.6	2665.0	2649.9
92	2907.1	2833.6	2798.0	2779.5
96	3045.0	2968.8	2932.2	2912.5
100	3183.2	3104.3	3066.3	3045.7
104	3321.6	3240.0	3200.6	3179.2
108	3460.1	3376.0	3335.1	3312.8
112	3598.9	3512.2	3469.8	3446.8
116	3737.8	3648.5	3604.8	3580.9
120	3876.9	3785.1	3739.9	3715.2
124	4016.1	3921.8	3875.2	3849.7
128	4155.4	4058.7	4010.7	3984.4
132	4294.9	4195.8	4146.4	4119.3

No. of ports	60s sessions r=0.1	120s sessions r=0.05	180s sessions r=0.03	300s sessions r=0.02
136	4434.5	4333.0	4282.3	4254.4
140	4574.2	4470.4	4418.2	4389.6
144	4714.1	4607.9	4554.4	4524.9
148	4854.0	4745.5	4690.7	4660.4
152	4994.1	4883.3	4827.1	4796.0
156	5134.2	5021.1	4963.6	4931.8
160	5274.5	5159.1	5100.3	5067.7
164	5414.8	5297.3	5237.1	5203.7
168	5555.2	5435.5	5374.0	5339.8
172	5695.7	5573.8	5511.0	5476.0
176	5836.3	5712.2	5648.2	5612.4
180	5976.9	5850.8	5785.4	5748.8
184	6117.6	5989.4	5922.7	5885.4
188	6258.4	6128.1	6060.2	6022.1
192	6399.3	6266.9	6197.7	6158.8
196	6540.2	6405.8	6335.3	6295.7
200	6681.2	6544.7	6473.0	6432.6
204	6822.2	6683.8	6610.8	6569.6
208	6963.3	6822.9	6748.7	6706.7
212	7104.4	6962.1	6886.6	6843.9
216	7245.6	7101.3	7024.6	6981.2
220	7386.9	7240.7	7162.7	7118.6
224	7528.2	7380.1	7300.9	7256.0
228	7669.6	7519.5	7439.2	7393.5

No. of ports	60s sessions r=0.1	120s sessions r=0.05	180s sessions r=0.03	300s sessions r=0.02
232	7810.9	7659.1	7577.5	7531.1
236	7952.4	7798.6	7715.9	7668.7
240	8093.9	7938.3	7854.3	7806.4
244	8235.4	8078.0	7992.8	7944.2
248	8377.0	8217.8	8131.4	8082.0

Table 11-2: Erlang-B Traffic capacity (CCS) at P.02

Channels	Traffic (CCS)
4	40
8	131
12	238
16	356
20	477
24	601
28	727
32	857
36	987
40	1119
44	1252
48	1385
52	1519
56	1654
60	1790

Channels	Traffic (CCS)
64	1926
68	2063
72	2199
76	2337
80	2475
84	2613
88	2752
92	2891
96	3030
100	3167
104	3307
108	3446
112	3587
116	3727
120	3867
124	4008
128	4148
132	4289
136	4430
140	4571
144	4713
148	4854
152	4996
156	5137

Channels	Traffic (CCS)
160	5279
164	5421
168	5563
172	5705
176	5847
180	5989
184	6132
188	6274
192	6417
196	6559
200	6702
204	6844
208	6987
212	7130
216	7273
220	7416
224	7559
228	7702
232	7845
236	7988
240	8132
244	8275
248	8418

Table 11-3: Erlang-C traffic capacity (CCS) at P.01

Ports	Holding time (seconds)								
	10 r = 0.2	20 r = 0.1	30 r = 0.07	60 r = 0.03	90 r = 0.02	120 r=0.017	180 r=0.011	240 r=0.008	300 r=0.007
1	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	9.4
2	6.5	5.9	5.7	5.5	5.4	5.4	5.4	5.4	5.3
3	18.7	17.5	16.9	16.3	16.1	16.0	15.9	15.9	15.9
4	35.2	32.1	31.2	30.2	29.9	29.7	29.6	29.5	29.4
5	54.7	50.0	48.5	47.0	46.5	46.3	46.0	45.9	45.8
6	76.2	69.8	67.7	65.7	65.0	64.6	64.3	64.1	64.0
7	99.3	91.2	88.5	85.8	84.9	84.5	84.0	83.8	83.7
8	123.7	113.7	110.4	107.1	106.0	105.4	104.9	104.6	104.4
9	149.1	137.2	133.3	129.3	128.0	127.3	126.7	126.3	126.1
10	173.2	161.6	157.0	152.3	150.8	150.0	149.2	148.8	148.6
11	199.9	186.7	181.4	176.0	174.3	173.4	172.5	172.0	171.8
12	227.1	212.4	206.4	200.4	198.3	197.3	196.3	195.8	195.5
13	254.9	238.6	231.9	225.2	222.9	221.8	220.7	220.1	219.7
14	283.2	265.3	257.9	250.5	248.0	246.7	245.5	244.8	244.4
15	312.0	292.4	284.4	276.2	273.4	272.0	270.7	270.0	269.5
16	341.0	317.1	311.2	302.2	299.2	297.7	296.2	295.5	295.0
17	370.5	344.7	338.3	328.7	325.4	323.8	322.1	321.3	320.8
18	400.2	372.6	365.8	355.4	351.9	350.1	348.3	347.4	346.9
19	430.2	400.9	393.5	382.4	378.6	376.7	374.8	373.9	373.3
20	460.5	429.4	421.5	409.6	405.6	403.6	401.6	400.5	399.9
21	491.0	458.1	446.4	437.1	432.9	430.7	428.5	427.4	426.8
22	521.7	487.1	474.7	464.9	460.3	458.0	455.7	454.6	453.9
23	552.6	516.3	503.2	492.8	488.0	485.6	483.1	481.9	481.2

Ports	Holding time (seconds)								
	10 r = 0.2	20 r = 0.1	30 r = 0.07	60 r = 0.03	90 r = 0.02	120 r=0.017	180 r=0.011	240 r=0.008	300 r=0.007
24	583.7	545.7	531.9	520.9	515.9	513.3	510.7	509.5	508.7
25	615.0	575.2	560.8	549.3	543.9	541.2	538.5	537.2	536.3
26	646.5	619.5	539.8	577.7	572.1	569.3	566.5	565.0	564.2
27	615.0	592.2	619.1	606.4	600.5	597.6	594.6	593.1	592.2
28	709.8	665.0	648.5	635.2	629.1	626.0	622.3	621.3	620.3
29	741.7	695.2	678.0	664.1	677.7	654.5	651.3	749.6	648.6
30	773.7	725.5	707.7	693.2	686.6	683.2	679.8	678.1	677.1
31	805.8	756.0	737.5	722.4	715.5	712.0	708.5	706.7	705.6
32	838.0	786.6	767.4	751.8	744.6	740.9	737.3	735.4	734.3
33	870.3	817.4	797.5	776.6	773.8	770.0	766.2	764.3	763.1
34	902.8	848.2	827.7	806.1	803.1	799.1	795.2	793.2	792.0
35	935.3	879.1	858.0	835.6	832.5	828.4	824.3	822.3	821.0
36	967.9	910.2	888.3	867.3	862.0	857.8	853.6	851.4	850.2
37	1000.6	941.4	918.8	895.0	891.6	887.3	882.9	880.7	879.4
38	1033.4	972.6	949.4	924.9	921.3	916.8	912.3	910.1	908.7
39	1066.2	1003.9	980.1	954.8	951.1	946.5	941.8	939.5	938.1
40	1099.2	1035.4	1010.9	984.8	981.0	976.2	971.4	969.0	967.6
41	1132.2	1066.9	1041.7	1014.9	1005.7	1004.1	1001.1	998.6	997.2
42	1165.3	1098.4	1072.6	1045.1	1035.6	1034.0	1030.9	1028.3	1026.8
43	1198.4	1130.1	1103.7	1075.4	1065.6	1064.0	1060.8	1058.1	1056.5
44	1231.6	1161.8	1134.7	1105.8	1095.7	1094.0	1090.7	1088.0	1086.3
45	1264.9	1193.6	1165.9	1136.2	1125.9	1123.2	1120.7	1117.9	1116.2
46	1298.2	1225.5	1197.1	1166.7	1156.1	1153.4	1150.7	1147.9	1146.2
47	1331.6	1257.5	1228.4	1197.3	1186.4	1183.9	1180.9	1177.9	1176.2

Ports	Holding time (seconds)								
	10 r = 0.2	20 r = 0.1	30 r = 0.07	60 r = 0.03	90 r = 0.02	120 r=0.017	180 r=0.011	240 r=0.008	300 r=0.007
48	1365.0	1289.5	1259.8	1227.9	1216.8	1213.1	1211.1	1208.1	1206.3

Chapter 12: System sizing

IVR port sizing

To determine the system requirements for IVR, it is very important to analyze the customer's specific applications. IVR systems can vary widely in terms of calls requiring processing and the holding times of those calls.

To ensure the IVR System provides adequate capacity, follow these steps for each IVR application.

1 Estimate the number of calls per busy hour.

2 Estimate the average length of a call in seconds. An average holding time for a short IVR application may be 30 seconds, while a lengthy IVR application may be 300 seconds.

3 Estimate total time in seconds for each application by multiplying the Step 1 estimate by the Step 2 estimate (1 CCS = 100 seconds).

4 Add the total time for all applications residing on the system.

5 To determine the fewest number of ports required to accommodate the total activity for the system, use the number from Step 4 and refer to “Traffic capacity tables” on page 11-3 to find the number of ports that best accommodates the total activity calculated above given the grade of service required.

Example

A customer has three IVR applications: IVR_MAIN which answers all calls to the company, IVR_CHILD_1 and IVR_CHILD_2. The average delay for callers must not exceed six seconds and no more than 5% of callers should encounter a delay in the busy hour (equates to 5% delay Grade Of Service).

Table 12-1: Example table for GOS P.05

Procedure	Step 1	X Step 2	= Step 3
Application	**Calls in busy hour**	**X Holding time (seconds)**	**Total time (seconds)**
IVR_MAIN	200	X 20	4,000 seconds
IVR_CHILD_1	10	X 240	2,400 seconds
IVR_CHILD_2	30	X 180	5,400 seconds
Total time			11,800 seconds or 118 CCS

The total system activity for all IVR applications in this example is 118 CCS. Refer to Table 11-1, “Erlang-C traffic capacity (CCS) at P.05,” on page 11-4 to determine the number of ports the IVR requires to support this scenario. To handle the system activity of 118 CCS, a total of 8 ports are required which will handle up to 150.5 CCS.

Fax port sizing

Fax response traffic model

The fax response traffic model has both queuing and blocking.

A Call Back fax application is one where the IVR system dials a fax machine to send a fax after the call to the IVR system requesting the fax has terminated. A pure queuing model is used for a Call Back Fax application.

The Same Call fax application is one where fax transmission takes place on the same IVR call that makes the request for the fax to be sent or received. The Same Call fax application uses a blocking model.

Target fax Grade of Service

The factors affecting fax GOS are:

- the number of faxes requested in a busy hour.
- the average number of pages to be transmitted, their resolution, and their density.
- average transmit time per page.
- the number of fax ports available.

Fax receiving and sending are one operation to an IVR application. Therefore factors 2 and 3 will determine how long a fax port is held. Together with factor 1, this determines the fax call capacity[1].

The fax GOS is important in a Same Call fax situation because the fax operation will take place on the same IVR call. The GOS is the probability that a fax port does not become available (i.e. it is blocked).

The target GOS for Call Back fax is the probability that a fax sitting in the queue waiting to go out exceeds a certain time. This is important when an IVR application promises to send a fax within a certain time.

Another factor which may affect the fax GOS is the probability that the remote machine is busy. If the fax is being sent with a retry option, it will be queued up again. For the purposes of this document, it is assumed that the remote fax machine is never busy.

Fax on Demand (Call Back Delivery)

The number of fax ports required to service a Call Back fax application is determined by the application. The application has two parts to it: the initial call which requests the fax to be sent and the fax call itself. Only the fax call uses fax ports.

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1. An analysis was done for fax session length and number of pages in each fax at the TOR site (for MM9). The average session length was 234 seconds and the average number of pages in each fax was 4.8. These figures were considered a useful starting point for the fax traffic tables. It should also be noted that the hold time does not affect an Erlang-B distribution but does affect the call capacity.

For example, the call receiving the request could include the following:

- the time to listen to voice menu (e.g. 15 seconds)
- the time to select options (e.g. 10 seconds for each option selected)
- the time to enter call-back number and extension (e.g. 30 seconds)

The fax port hold time may include:

- a 5 second time to setup the call
- a 10 second time to answer the call
- a 12 second time to establish the protocol
- a 40 second time for each page in normal resolution and 80 seconds for each page in fine resolution
- a 10 second time to terminate the call

Table 12-2 specifies the call capacity that can be handled by a specified number of fax ports in a queueing traffic model. This traffic volume is based on an Erlang-C distribution with a 5% probability that the wait time will exceed 6 seconds. The fax port hold time is estimated at 180 seconds. The ratio of tolerable delay to hold time is 0.03 and is denoted by *r* in the table.

Table 12-2: Erlang-C traffic capacity (CCS) at P.05 for Call Back Fax

Fax ports	Hold time (180 seconds) *r* = 0.03
2	12.7
4	48.7
6	93.4
8	142.7
10	194.9
12	249.1
14	304.9
16	362.0
18	400.7
20	456.8
22	513.6
24	571.0
26	628.9
28	687.2
30	746.0
32	805.1
34	864.5
36	924.2
38	984.2
40	1044.5
42	1105.0
44	1165.7
46	1226.6
48	1287.7

Fax on Demand (Same Call Delivery)

The number of fax ports required to service a Same Call Delivery fax application is determined by the application. The application has two parts to it: the initial call which requests the fax to be sent and the fax call itself. Only the fax call uses fax ports.

For example, the call receiving the request could include the following:

- the time to listen to voice menu (e.g. 15 seconds)
- the time to select options (e.g. 10 seconds for each option selected)
- the time to enter call-back number and extension (e.g. 30 seconds)

The fax port hold time may include:

- a 5 second time to setup the call
- a 10 second time to answer the call
- a 12 second time to establish the protocol
- a 40 second time for each page in normal resolution and 80 seconds for each page in fine resolution
- a 10 second time to terminate the call

Table 12-3 specifies the call capacity that can be handled by a specified number of fax ports in a blocking traffic model. This traffic volume is based on an Erlang-B distribution with a 2% probability that the call will be blocked.

Table 12-3: Erlang-B traffic capacity (CCS) at P.02 for Same Call Delivery

Fax ports	(CCS)
2	8.1
4	39.8
6	83.0
8	130.7
10	183.2
12	238.3
14	295.4
16	356.5
18	416.5
20	477.4
22	539.2
24	601.7
26	664.9
28	728.5
30	792.6
32	857.2
34	922.1
36	986.4
38	1053.0
40	1118.9
42	1185.1
44	1251.5
46	1318.1
48	1385.0

Example 1 - Call Back Fax Delivery

A customer has two IVR applications: IVR_MAIN answers a voice call, requests that the caller selects a fax to deliver, and gets the fax number. IVR_CHILD does the fax delivery.

IVR_CHILD has a holding time of 5s (to setup the call) + 10s (to answer the call) + 12s (to establish protocol) + 4.8 pages * 40s (40 seconds per page in normal resolution) + 10s (to terminate the fax connection) =229 seconds.

Table 12-4: Example table for FAX Port GOS P.05 and P.02

Procedure	Step 1	X Step 2	= Step 3
Application	**Calls in busy hour**	**X Holding time (seconds)**	**Total time (seconds)**
IVR_MAIN	30		
IVR_CHILD	28	X (5+10+12+10+ 4.8 * 40))	6,412 seconds
Total time			6,412 seconds or 64 CCS

The total usage of the fax ports for the Call Back fax application is 64 CCS. The ratio of tolerable delay to hold time is r=0.03. Use Table 12-2, “Erlang-C traffic capacity (CCS) at P.05 for Call Back Fax,” on page 12-5 to determine the number of fax ports required. For r=0.03 and 64 CCS, the IVR requires a total of 6 fax ports to support this Call Back fax application scenario.

Example 2 - Same Call Fax Delivery

A customer has 2 IVR applications: IVR_MAIN answers a voice call, requests that the caller selects a fax to deliver, and gets the fax number; IVR_CHILD does the fax delivery.

IVR_CHILD has a holding time of 5s (to setup the call) + 10s (to answer the call) + 12s (to establish protocol) + 4.8 pages * 40s (40 seconds per page in normal resolution) + 10s (to terminate the fax connection) =229 seconds.

Table 12-5: Example table for FAX Port GOS P.05 and P.02

Procedure	Step 1	X Step 2	= Step 3
Application	**Calls in busy hour**	**X Holding time (seconds)**	**Total time (seconds)**
IVR_MAIN	30		
IVR_CHILD	28	X (5+10+12+10+ 4.8 * 40))	6,412 seconds
Total time			6,412 seconds or 64 CCS

The total usage of the fax ports for the Same Call fax application is 64 CCS. By referring to Table 12-3 for 64 CCS, the IVR requires a total of 6 fax ports to support this Same Call fax application scenario.

Text-to-Speech port sizing

Text-To-Speech (TTS) port sizing is independent of the technology used.

To determine the correct number of Antares boards and channels needed for an application using TTS functionality, follow these steps.

1 Estimate the overall call capacity. Use this to determine the number of IVR ports required on the system

2 Estimate the number of TTS channels needed to serve the traffic given by step 1. This is a function of the average hold time of a TTS channel during a call.

3 Determine the number of Antares boards needed given the number of TTS channels and the number of DSPs required per instance. Please refer to Chapter 14 for more information about the number of ports supported by the different TTS algorithms on the Antares card.

Text-to-Speech hold time

The time required for the TTS resource to become available is configurable within the SAY cell, with 75 seconds as the maximum value (although it is recommended that this maximum value not be used).

The hold time of a TTS channel is the sum of the following times:

1 The time for the TTS resource to become available to start "SAYING" the text (i.e. from the time the resource is held and is requested to "SAY" the text to the time it actually starts "SAYING" the text.)

2 The time to "SAY" the contents of the buffers or text files. This is dependent on the amount of text to output.

3 Whether cut-through is enabled, as this may reduce the average hold time for some applications.

4 The time needed to request the disconnect from the TTS resource. Typically, this is less than 1 second.

Typically, the TTS hold time equals the time for the IVR system to "SAY" the required text + 5 seconds.

Text-to-Speech Grade Of Service

The typical traffic model used for TTS is non-blocking since the requests for a resource are queued if the resource is not available. Thus the traffic is based on an Erlang-C distribution.

The factors affecting TTS GOS include:

1 The average hold time of the TTS port.

2 The number of times the TTS operation occurs in a given call.

3 The number of calls in a busy hour.

4 The number of TTS ports available.

The GOS is the probability that a TTS port does not become available in a certain time (which could be 0, in which case the traffic model is blocking).

Example

A customer has two applications. The main IVR application (IVR_MAIN) answers all calls to the company. The other application, IVR_TTS, utilizes TTS functionality.

The typical session duration for IVR_MAIN is 30 seconds (time to listen to greeting prompt + time to listen to voice menu + time to make selection).

The typical session duration for IVR_TTS is 50 seconds (time to listen to prompt + time to make selection + time to get response). The TTS resource is held for 15 of those 50 seconds.

The tolerable delay for callers must not exceed one ring cycle (6 seconds) and no more than 5% of callers should encounter a delay of more than 6 seconds in the busy hour (equates to 5% GOS for the call). Furthermore, the tolerable delay in obtaining the TTS resource should not exceed 2 seconds and no more than 1% of callers should experience a delay exceeding 2 seconds in obtaining that resource (equates to a 1% GOS for TTS).

Table 12-6: Example 1—table for Text-to-Speech

Procedure	Step 1	X Step 2	= Step 3
Application	**Calls in busy hour**	**X Holding time (seconds)**	**Total time (seconds)**
IVR_MAIN	100	X 30	3,000 seconds
IVR_TTS_1	50	X 50	2,500 seconds
IVR_TTS_1 TTS board	50	X 15	750 seconds
Total time for IVR ports			5,500 seconds or 55 CCS
Total time for TTS Ports			750 seconds or 7.5 CCS

Total system activity for the IVR applications is 55 CCS. The ratio of tolerable delay to hold time is 6/80 = 0.08 (denoted by *r* in the tables). Table 11-1, “Erlang-C traffic capacity (CCS) at P.05,” on page 11-4 for 55 CCS indicates that the total IVR port requirements for a GOS of P.05 is 8.

The total hold time for the TTS ports is 7.5 CCS. The ratio of tolerable delay to hold time is 2/15 = 0.13 (denoted by *r* in the tables). Table 11-3 for *r* = 0.1 indicates that there is a need for 3 TTS ports.

Speech Recognition port sizing

To determine the correct number of Speech Recognition (SR) boards and channels needed for an application, follow these steps.

1 Estimate the overall call capacity. Use this to determine the number of IVR ports required on the system.

2 Estimate the number of recognition channels needed to serve the traffic given by step 1. This is a function of the average hold time of a recognition channel during a call.

3 Determine the number of SR boards to use. The number of Antares boards to use can be determined given the number of recognition channels, the number of DSPs required per recognition, and the type of recognition needed. Alternately, the number of VR/160 boards to use can be determined given the number of recognition channels, the number of VRM/40 or VRM/2C daughter boards required and the type of recognition needed. Please refer to Chapter 14 for information about the number of channels supported by each of these boards.

Speech Recognition hold time

The hold time of a recognition channel is the sum of the following:

1 The time required for the speech recognition technology to start recognizing speech (i.e., to start “listening” for voice input). This will typically be less than one second.

2 The time for the user’s speech input. This time is dependent on the caller, the application and on the type of input needed (e.g. digits vs. sentences).

3 The time that the recognizer needs to conclude that the caller has finished speaking. This will typically be less than one second.

4 The time needed to analyze what the caller has said. This is dependent on the size of the vocabulary and of the CPU.

5 The time needed to release the recognizer. Typically, this is less than one second.

6 The time required to play prompts while the recognizer is connected. This is dependent on the application.

7 Whether barge-in is enabled or not. If barge-in is enabled, then the resource will be connected while prompts are being played.

8 Whether recognition is enabled per call or per recognition at the time of installation. This is dependent on the Technology used. If it is enabled per call, then all prompts, queries, etc. between the VINP cells would be part of the hold time. If it is enabled per recognition, then the hold time only consists of items from points 1-7 above.

Typically, the SR hold time equals the time allowed for the caller to speak + 2-5 seconds.

Speech Recognition response time

The factors affecting the response time of the speech recognition card include:

1 The performance of the speech recognition card used

2 The speech recognition technology used

3 The size of the active vocabulary

4 The percentage of PC CPU available for speech recognition

As the vocabulary size increases, the CPU utilization also increases.

Speech Recognition Grade Of Service

The typical traffic model used for speech recognition is non-blocking since the requests for a recognizer are queued if a recognizer is not immediately available. Thus the traffic is based on an Erlang-C distribution.

The factors affecting SR GOS include:

1 The average hold time of the SR port.

2 The number of times the SR operation occurs in a given call.

3 The number of calls requested in the busy hour.

4 The number of SR ports available.

The GOS is the probability that a SR port does not become available in a certain time (which could be 0, in which case the traffic model is blocking).

Example 1

A customer has two applications. The main IVR application (IVR_MAIN) answers all calls to the company. The other application, IVR_SR, utilizes SR functionality.

The typical session duration for IVR_MAIN is 30 seconds (time to listen to greeting prompt + time to listen to voice menu + time to make selection).

The typical session duration for IVR_SR is 30 seconds (time to listen to prompt + time to make selection + time to get response). The speech recognition resource is held for 20 of those 30 seconds.

The tolerable delay for callers must not exceed one ring cycle (6 seconds) and no more than 5% of callers should encounter a delay in the busy hour (equates to 5% GOS for the call). Furthermore, the tolerable delay in obtaining the SR resource should not exceed 2 seconds and no more than 1% of callers should experience a delay in obtaining that resource (equates to a 1% GOS for SR).

Table 12-7: Example 1—table for Speech Recognition

Procedure	Step 1	X Step 2	= Step 3
Application	**Calls in busy hour**	**X Holding time (seconds)**	**Total time (seconds)**
IVR_MAIN	100	X 30	3,000 seconds
IVR_SR	50	X 30	1,500 seconds
IVR_SR SR board	50	X 20	1,000 seconds
Total time for IVR ports			4,500 seconds or 45 CCS
Total time for SR Ports			1,000 seconds or 10 CCS

Total system activity for the IVR SR applications is 45 CCS. Table 11-1, “Erlang-C traffic capacity (CCS) at P.05,” on page 11-4 for 45 CCS indicates that the total IVR port requirements for SR is 4. The total hold time for the SR ports is 10 CCS. Table 11-3 for 10 CCS for a 20-second hold time indicates that there is a need for 3 recognizer channels.

Example 2

A customer has two applications. The main IVR application (IVR_MAIN) answers all calls to the company. The other application, IVR_SR_1, utilizes SR functionality.

The typical session duration for IVR_MAIN is 30 seconds (time to listen to greeting prompt + time to listen to voice menu + time to make selection).

The typical session duration for IVR_SR_1 is 50 seconds (time to listen to prompt + time to make selection + time to get response). The call dialog requires 2 recognition requests on average, with an average hold time of 15 seconds each.

The tolerable delay for callers must not exceed one ring cycle (6 seconds) and no more than 5% of callers should encounter a delay in the busy hour (equates to 5% GOS for the call). Furthermore, the tolerable delay in obtaining the SR resource should not exceed 2 seconds and no more than 1% of callers should experience a delay in obtaining that resource (equates to a 1% GOS for SR).

Table 12-8: Example 2—table for Speech Recognition

Procedure	Step 1	X Step 2	= Step 3
Application	**Calls in busy hour**	**X Holding time (seconds)**	**Total time (seconds)**
IVR_MAIN	100	X 30	3,000 seconds
IVR_SR_1	50	X 50	2,500 seconds
IVR_SR_1 SR board	50	X (2*15)	1,500 seconds
Total time for IVR ports			5,500 seconds or 55 CCS
Total time for SR Ports			1,500 seconds or 15 CCS

Total system activity for the IVR SR applications is 55 CCS. Table 11-1, “Erlang-C traffic capacity (CCS) at P.05,” on page 11-4 for 55 CCS indicates that the total IVR port requirements for SR is 8. The total hold time for the SR ports is 15 CCS. Table 11-3, “Erlang-C traffic capacity (CCS) at P.01,” on page 11-10 for 15 CCS for a 30-second hold time indicates that there is a need for 3 recognizer channels.

Dial Pulse Detection port sizing

An OPEN IVR application may accept input from a rotary telephone. The number of IVR ports required to support Dial Pulse Detection (DPD) is determined in the same way as described in “IVR port sizing” on page 12-1 since the DPD-enabled port is held for the duration of the call.

Typically, a call from a rotary telephone will require longer input times than a call from a DTMF-capable telephone as each entered digit takes longer to process. This is the only factor which affects the call hold time. Thus the applications input cells, such as GDAT and MENU, must take this into consideration. For example, a GDAT cell in an application which only accepts DTMF input may use a time-out value of 15 seconds whereas the same GDAT cell in the DPD-enabled environment may need a time-out of 30 seconds to support the longer input time required for each digit.

To properly determine the number of ports required to support DPD, the hold time (or execution time) of the application must be determined for both DTMF and DPD input. The total number of calls in the busy hour must be estimated, as must the percentage of calls coming from DTMF and DPD lines.

> ***Note:*** DPD-enabled cards are not sharable resources. This means that a call which is accepted by a non-DPD-enabled card can not use the resources of the DPD-enabled card.

Example

A customer has one IVR application, IVR_APP, which accepts input from rotary telephones. As a result, the IVR ports required to service this application must be enabled for DPD. The typical session duration for IVR_APP is 55 seconds when the caller uses a rotary telephone and 35 seconds when the caller uses a DTMF-capable telephone. Eighty percent of calls are from rotary telephones.

The tolerable delay for callers must not exceed one ring cycle (6 seconds) and no more than 5% of callers should encounter a delay greater than 6 seconds in the busy hour (equates to a percentage GOS for the call).

Table 12-9: Example table for GOS P.05

Procedure	Step 1	X Step 2	= Step 3
Application	**Calls in busy hour**	**X Holding time (seconds)**	**Total time (seconds)**
IVR_APP (DTMF)	80 X 20%	X 35	560 seconds
IVR_APP (DPD)	80 X 30%	X 55	3,520 seconds
Total time			4,080 seconds or 40.8 CCS

The total usage of ports for the application is 40.8 CCS. By referring to Table 11-1, “Erlang-C traffic capacity (CCS) at P.05,” on page 11-4 for 40.8 CCS, the IVR requires a total of 4 IVR ports enabled with DPD.

Memory sizing

Memory requirements

The following “point system” can be used to determine which combinations of features and capacity will fit on an Symposium OPEN IVR 4.0 system. The points are based on total system memory (1 point - 100K). Note that this point system is not intended to accurately predict the free memory for the system, but rather to predict which combinations of features can be installed before exhausting available memory on the system. The values in the tables, with the exception of those related to IPML, are derived from measurements of allocated memory on the Symposium OPEN IVR 4.0 system. The values related to IPML are derived from measurements of virtual memory on the Symposium OPEN IVR 4.0 system.

Note: Frequent swapping of more than the "Total Permitted Swapping" amount over a long period of time, which can be recognized by an abnormally slow system, will require adding more physical memory. This is applicable to the AP, MRS and MRS/AP.Only the 486 MRS can not be expanded beyond 32 Mbytes of memory. To determine a system's swapping statistics, refer to the SCO OPEN Desktop/SCO OPEN Server System Administrator's Guide.

Table 12-10: Memory requirements for the AP

Note: 32 Mbytes of memory is equal to 328 points, 64 Mbytes of memory is equal to 656 points, and 96 Mbytes of memory is equal to 984 points.

	Points	
Total permitted swapping	72	72
Total physical memory	656	983
Operating system	120	128
Total available points	**608**	**927**
Core IVR processes		
IVR (Development/ Run Time)[a]	185/129	
IVR ports	1 per 6 channels	
Host option (Core)		
Host sessions (3270, VT100 and 5250)	H	
Core IPML	120	
IPML usage per channel	0.2	
Each agent monitored by IPML	0.1	
UPS option	14	
SQL database (local or remote)[b]	100	
ADSI option	4	
User functions[c]		

a. Development includes the *xae* process as well as other processes which are used mainly for development purposes. Run-Time includes processes that are always present and independent of any configuration.
b. This is a typical SQL Database memory requirement.
c. To determine the User Functions memory requirements, find what resources the user function uses and then refer to the SCO OPEN Desktop/SCO OPEN Server System Administrator's Guide.

Table 12-11: Memory requirements for the MRS

Note: 32 Mbytes of memory is equal to 328 points, 64 Mbytes of memory is equal to 656 points, and 96 Mbytes of memory is equal to 984 points.

	Points		
Total permitted swapping	72	72	72
Total physical memory	328	656	983
Operating system	112	233	236
Total available points	**288**	**495**	**819**
Core IVR processes			
IVR Base	78		
IVR ports	1 per channel		
UPS option	14		
Aculab E1 option (per card)	4		
L&H Antares TTS option (per card)	5		
TruVoice Antares TTS option (per card)	6		
Fax option (generic process)[a]	2		
Brooktrout Fax option (per channel)	3		
GammaLink Fax option (per card)	5		
T1 option	10		
PureSpeech Voice Recognition option	17		
VCS Antares Voice Recognition option	22		
VCS on VR/160 Voice Recognition option	5		
Disk mirroring option			

a. The Generic Fax option should be included once if fax is enabled on the system, regardless of which type of fax board is used.

Table 12-12: Memory requirements for the MRS/AP

Note: 32 Mbytes of memory is equal to 328 points, 64 Mbytes of memory is equal to 656 points, and 96 Mbytes of memory is equal to 984 points.

	Points	
Total permitted swapping	42	42
Total physical memory	656	984
Operating system	119	127
Total available points	**579**	**898**
Core IVR processes		
IVR (Development/ Run Time)[a]	232/194	
IVR ports	1 per channel	
T1 option	10	
UPS option	14	
Host option (Core)		
Host sessions (3270, VT100 and 5250)	H	
Core IPML	120	
IPML usage per channel	0.2	
Each agent monitored by IPML	0.1	
SQL database (local or remote)[b]	100	
ADSI option	4	
Aculab E1 option (per card)	4	
L&H Antares TTS option (per card)	4	
TruVoice Antares TTS option (per card)	6	
Fax option (generic)[c]	2	

Brooktrout Fax option (per channel)	3
GammaLink Fax option (per card)	4
PureSpeech Voice Recognition option	17
VCS Antares Voice Recognition option	22
VCS on VR/160 Voice Recognition option	5
User functions[d]	

a. Development includes the *xae* process as well as other processes which are used mainly for development purposes. Run-Time includes processes that are always present and independent of any configuration.
b. This is a typical SQL Database memory requirement.
c. The Generic Fax option should be included once if fax is enabled on the system, regardless of which type of fax board is used.
d. To determine the User Functions memory requirements, find what resources the user function uses and then refer to the SCO OPEN Desktop/SCO OPEN Server System Administrator's Guide.

Hard disk sizing

The disk partition tables shown in chapter 5 for the MRS and MRS/AP indicate the VSN volume sizes in megabytes. Sometimes it is useful to know the storage capacity of a VSN volume in hours rather than megabytes. To convert megabytes into hours, the formula shown in Figure 12-1 should be used.

Figure 12-1: Formula to convert Mbytes into hours

$$\text{storage [hours]} = \frac{\text{storage [Mbytes]} \times 8 \text{ bits/byte} \times 1000 \text{ Kbyte/Mbytes}}{\text{bit rate [kbits/sec]} \times 3600 \text{ sec/hour}}$$

For example, if a VSN volume has a size of 442 Mbytes, and the bit rate is 32 kbits/sec, the storage capacity in hours can be calculated as follows:.

$$\text{storage} = \frac{442 \text{ Mbytes} \times 8 \times 1000}{32 \text{ kbits/sec} \times 3600 \text{ sec/hour}} = 30.69 \text{ hours}$$

VSN volume sizing

The number of VSN volumes required on an IVR system is dependent on the following:

1 Each VSN volume can support up to 13,824 VSN files.

2 Each VSN volume can occupy as much disk space as is available.

3 A VSN volume can not span disks.

4 The maximum number of VSN volumes an IVR system can support is 4.

The minimum number of VSN volumes can be determined by using the formula shown in Figure 12-2.

Figure 12-2: Formula for the minimum number of VSN volumes

$$\text{Number of VSN volumes} = \frac{\text{Total \# of VSN files}}{13\,824}$$

However, the available disk space and the average size of the VSN files may mean that more than the minimum number of VSN volumes are required. For example, an IVR system using very large prompts may not be able to store 13,000 VSN files in one volume since the total size of the VSN files exceeds the available disk storage allocated to the VSN volume. In this case, another VSN volume would be needed to store any VSN files which could not fit on the first VSN volume.

The following algorithm can be used to estimate the total number of VSN volumes needed using the disk storage configurations outlined in Chapter 5:

1 Let x be the number of VSN files that need to be stored.

2 Let y be the number of VSN volumes that are required. Let y = 0 initially.

3 Let z be the number of VSN files that can fit on the available disk space.

4 Let b be the number of VSN volumes required on the given disk.

5 Calculate the average VSN file size if it is not already known using the formula shown in Figure 12-3 on page 12-26.

6 Start with the first hard disk configuration supported in Chapter 5.

7 While x is greater than 0:

a Calculate the number of VSN files that can fit on the available disk space (z) using the formula found in Figure 12-4 on page 12-26.

b If z is equal to or greater than x, then calculate the # of VSN volumes required (b) using the formula in Figure 12-5 on page 12-26, replacing a in the formula with x. Round b up to the nearest integer. Re-calculate y as y = y + b. Terminate this algorithm by going to step 8.

c If z is less than x, then calculate the number of VSN volumes required (b) using the formula in Figure 12-5 on page 12-26, replacing a with z. Round b up to the nearest integer. Re-calculate y as y = y + b.

d Re-calculate x as x = x - z.

e select the next disk configuration as outlined in Chapter 5 and start again at step i.

8 Evaluate the allocation of VSN files per VSN volume to ensure that no VSN volume is under-utilized or contains the VSN files of another VSN volume, thus reducing the total number of VSN volumes. Table 12-15 on page 12-28 illustrates this scenario with an example.

The hard disk configuration which is present when this algorithm terminates is the required hard disk configuration.

The following assumptions must be adhered to for this algorithm to work:

1 The available disk space across all disks is greater than or equal to the disk space required by all VSN files (where the disk space required for all VSN files can be estimated as the average VSN file size X total number of VSN files).

2 There is no VSN file which exceeds the available disk space of every available disk.

Note: For the sake of simplicity, kbits are used throughout these calculations. The user can easily convert kbits to Mbyte, bytes, etc. It is assumed that the reader knows these conversions and thus they are not provided in this document.

If the bit rate and the average time of the message are known, then the formula shown in Figure 12-3 can be used to determine the average size of the VSN file.

Figure 12-3: Calculation of average VSN file size

$$\text{average VSN file size [kbits/VSN]} = \text{average time of a VSN [secs/VSN]} \times \text{sampling rate [kbits/sec]}$$

Assuming that the average size of the voice recording is less than the total available disk space, the number of VSN files which can fit on the available disk space can be calculated using the formula shown in Figure 12-4.

Figure 12-4: Calculation of the number of VSN files that can fit on the available disk space

$$\text{Number of VSN files that can fit on the available disk space} = \frac{\text{Available disk space}}{\text{average VSN file size [kbits/vsn]}}$$

Finally, the number of VSN volumes can be calculated using the formula shown in Figure 12-5.

Figure 12-5: Calculation of number of VSN volumes

$$\text{Number of VSN volumes} = \frac{a}{13{,}824}$$

where
a is the number of VSN files which will be stored on the disk

Example

A customer is considering a system where there is an estimated 15,000 VSNs. The average VSN size is 4 kbits. The customer has 60,000 kbits of disk space available.

The minimum number of VSN volumes that can be supported can be calculated as:

$$\frac{15,000}{13\,824} = 1.085 \text{ or } 2 \text{ VSN Volumes}$$

The algorithm and formulae described above can be used to determine the number of VSN volumes needed to support the system, as well as estimate the number of VSN files that can be stored on each disk.

In the first example, the 60,000 kbits of available disk space resides on the first disk.

Table 12-13: Example 1 of VSN volume sizing

Disk	Available disk space [kbits]	Number of files which can be stored	Number of VSN volumes on that disk	Number of VSN files stored per VSN Volume
1	60,000	15,000	2	1st Volume: 13,824 VSN files 2nd Volume: 1,176 VSN files
Total VSN Volumes	**2**			

In the second example, the 60,000 kbits of available disk space resides on 3 disks of 10,000, 30,000 and 20,000 kbits respectively.

Table 12-14: Example 2 of VSN volume sizing

Disk	Available disk space [kbits]	Number of files which can be stored	Number of VSN volumes on that disk	Number of VSN files stored per VSN Volume
1	10,000	2,500	1	2,500
2	30,000	7,500	1	7,500
3	20,000	5,000	1	5,000
Total VSN Volumes	**3**			

In the third example, the amount of available disk space is 75,000 kbits. The first disk supports 56,000 kbits while the second disk supports 19,000 kbits. As the example demonstrates, the 3rd VSN volume is under-utilized. The VSN files allocated to the 2nd VSN volume could be contained in the 3rd VSN volume, thus the total of VSN volumes could be reduced to 2.

Table 12-15: Example 3 of VSN volume sizing

Disk	Available disk space [kbits]	Number of files which can be stored	Number of VSN volumes on that disk	Number of VSN files stored per VSN Volume
1	56,000	14,000	2	1st Volume: 13,824 VSN files 2nd Volume: 176 VSN files
2	19,000	4,750	1	1,000
Total VSN Volumes	**3**			

Sizing for outbound applications

An IVR application may use the outcalling feature. Depending on the numbers and length of these calls, a number of outcalling channels must be configured. The number is determined in exactly the same way as for incoming IVR ports (see “IVR port sizing” on page 12-1) although the GOS can be lax depending on the application (a machine is calling now and it can try again if it is blocked). These channels may NOT be used for incoming calls. Thus in a system with outcalling applications, this must be taken into consideration when determining the number of available ports on the IVR.

Two types of outbound applications exist: those which bridge or transfer a call and those where the incoming call terminates and the outgoing call is scheduled to execute at a later time (e.g. hotel wake-up calls). In the first case, the IVR system may or may not remain in the conference, depending on how the application is built or the switch is configured to handle this situation. This will be a major factor in determining the holding time of the application.

Example

A customer has 4 IVR applications. The main IVR application (IVR_MAIN) answers all calls to the company; IVR_CHILD_1 calls the party entered by the incoming caller; IVR_CHILD_2 requests the number of the party to call at a later date then terminates; IVR_CHILD_3 calls the party provided by the previous caller of IVR_CHILD_2. The average delay for callers must not exceed one second and no more than 5% of callers should encounter a delay in the busy hour (equates to 5% delay Grade Of Service.) For the sake of simplicity, it is assumed that all outgoing calls in IVR_CHILD_1 and IVR_CHILD_3 have been answered and, for IVR_CHILD_1, the IVR system disconnects itself after the call has been connected.

Table 12-16: Example table for GOS P.05

Procedure	Step 1	X Step 2	= Step 3
Application	**Calls in busy hour**	**X Holding time (seconds)**	**Total time (seconds)**
IVR_MAIN	200	X 20	4,000 seconds
IVR_CHILD_1	40	X 240	12,000 seconds
IVR_CHILD_2	80	X 170	13,600 seconds
IVR_CHILD_3	80	X 15	1,200 seconds
Total time for IVR_CHILD_1			12,000 seconds or 120 CCS
Total time for IVR_CHILD_2			13,600 seconds or 136 CCS
Total time for IVR_CHILD_3			1,200 seconds or 12 CCS

IVR_CHILD_1 requires a mixture of incoming and outgoing ports in equal numbers. By referring to Table 11-1, “Erlang-C traffic capacity (CCS) at P.05,” on page 11-4, it is determined that the IVR system needs 8 IVR ports to support IVR_CHILD_1, distributed as 4 incoming and 4 outgoing.

IVR_CHILD_2 does not require any outgoing ports. It does, however, require incoming ports. By referring to Table 11-1, “Erlang-C traffic capacity (CCS) at P.05,” on page 11-4 for 136 CCS, it is determined that the IVR requires a total of 8 ports to support this scenario.

IVR_CHILD_3 uses only outgoing ports. It requires a total of 4 outgoing ports if using Table 11-1, “Erlang-C traffic capacity (CCS) at P.05,” on page 11-4.

OSIVR 4.0 supports up to 99 database server processes per database type (e.g. Oracle). The recommendation is that the number of database servers be equal to, or less than the number of database connection licenses. Opening more database servers to service the same database type does not provide any value and, in fact, may cause performance degradation.

The number of database server sessions can be determined if the following are known: the number of IVR channels, the total call time (T) and the database access time (t). One database session can support T/t channels of that application. However, a safety margin should be applied and each database session should support only T/2t channels.

For example, a 64 channel system is used. Each call lasts 100 seconds and the database access time for the entire call is 10 seconds. Each database session can support 100/(2*10) = 5 channels. Thus 64 channels would need 64/5 or 13 sessions.

Host server session sizing

To determine the number of IVR channels a host session can support, the total call time and the host access time must be known. If the total call time is T seconds and of that host access time is a total of t seconds, then one host session can support T/t channels of that application. However, a safety margin should be applied and each host session should support only T/2t channels.

For example, a 64 channel system is used. Each call lasts 100 seconds and the host access time for the entire call is 10 seconds. Each 3270 session can support 100/(2*10) = 5 channels. Thus 64 channels would need 64/5 or 13 sessions.

ADSI sizing

The number of IVR ports required to support an IVR system with ADSI capabilities can be determined using the method described in “IVR port sizing” on page 12-1. An ADSI application uses very specific cells to establish the protocol with the telephone, download data, set the softkeys, etc. ADSI application also use non-ADSI specific cells, such as GDAT or PDAT. Thus the total execution time of an ADSI application is a sum of:

1 the time to execute non-ADSI specific functions, such as play prompts

2 the time to execute ADSI specific functions, such as data download

The following ADSI cell execution times can be used when estimating the execution time for an ADSI application[1]:

- dsCON: 3.3 seconds

1. These values were determined in the TOR lab using a Symposium OPEN IVR 4.0 system running on Release 2 (700t) hardware and a Vista 350 ADSI telephone.

- dsDATA: 4.0 seconds
- dsDIS: 1.2 seconds
- dsINFO: 2.9 seconds
- dsKEYS: 3.2 seconds
- dsMENU: 2.7 seconds
- dsMODE: 1.0 seconds

Other ADSI specific cells, such as dsINPUT and dsUSER have variable execution times as they are dependent on user input and user function execution time respectively.

Example

A customer has four IVR applications: IVR_MAIN, IVR_CHILD1, IVR_CHILD2, and IVR_CHILD3. The main IVR application, IVR_MAIN, answers all calls and walks the customer through a menu. IVR_CHILD1 is used for non-ADSI capable telephones. IVR_CHILD2 and IVR_CHILD3 are ADSI applications. The typical session duration for IVR_MAIN is 30 seconds (time to listen to voice menu and make a selection). The typical session duration for IVR_CHILD1 is 60 seconds (time to enter DTMF data using the keypad and get a response from the system). The typical session duration of IVR_CHILD2 is 61.8 seconds (time to execute ADSI specific and non-ADSI cells). The typical session duration of IVR_CHILD3 is 44.2 seconds (time to execute ADSI specific and non-ADSI cells). Thus

IVR_CHILD2 Execution Time = 3.3s (one dsCON cell) + 2*3.2s (two dsKEYS cell) + 2.9s (one dsINFO cell) + 2*4.0s (two dsDATA cells) + 2*15s (two dsINPUT cells) + 1.2s (one dsDIS cell) + 10s (non-ADSI specific cells) = 61.8

IVR_CHILD3 Execution Time = 3.3s + (one dsCON cell) + 2.7s (one dsMENU cell) + 8s (one GDAT cell) + 4.0s (one dsDATA cell) + 15s (one dsINPUT cell) + 1.2s (one dsDIS cell) + 10s for non-ADSI specific functionality = 44.2s

Table 12-17: Example table for IVR ports for ADSI applications - GOS P.05

Procedure	Step 1	X Step 2	= Step 3
Application	**Calls in busy hour**	**X Holding time (seconds)**	**Total time (seconds)**
IVR_MAIN	30	X 30	900
IVR_Child1	10	X 60	600
IVR_Child2	10	X 61.8	618
IVR_Child3	10	X 44.2	442
Total time for P.05			2,560 seconds 25.6 CCS

The total usage of the IVR ports is 25.6 CCS. By referring to Table 11-1, “Erlang-C traffic capacity (CCS) at P.05,” on page 11-4 for 25.6 CCS, the IVR requires a total of 4 ports to support this scenario.

PBX Digit Tone Receiver sizing

It is important to engineer your switch for maximum DTR (if ACD log on or log off feature is used).

Minimum DTR (channels) = 1/3 x number of agents on IVR

Web port sizing

To accept connections from the WEB, the IVR system must be configured with a WEB MRS. The number of WEB ports required for a given IVR application can be determined using the method described in “IVR port sizing” on page 12-1.

An application accepting a WEB connection will typically take less time on the IVR system than the same application accepting a voice connection since no prompts are played and all input is provided up front (i.e. the application does not need to wait for user input). The execution time of the application, however, is still dependent on the functionality that needs to be performed. For example, an application which takes two integer inputs, adds them, and outputs the sum will probably take less time than an application which connects to a host to get information.

Table 12-18 specifies the call capacity that can be handled by a specified number of WEB ports in a queuing traffic model. This traffic volume is based on an Erlang-C distribution with a 5% probability that the wait time will exceed two seconds.

Table 12-18: Erlang-C traffic capacity (CCS) at P.05

Ports	Holding time (seconds)									
	1 r=2	2 r=1	3 r=0.7	4 r=0.5	5 r=0.4	6 r=0.33	7 r=0.29	8 r=0.25	9 r=0.22	10 r=0.2
1	10	5	4	3	3	3	3	2	2	2
2	39	27	22	19	18	17	16	16	16	15
3	73	56	47	43	40	38	37	36	35	34
4	107	87	76	70	66	63	61	59	58	57
5	142	120	107	99	93	89	87	85	83	82
6	177	153	139	129	122	118	114	112	110	108
7	212	187	171	160	153	147	143	140	137	135
8	242	222	204	192	184	177	173	169	166	164
9	283	256	237	224	215	208	203	199	196	193
10	319	291	271	257	247	240	234	229	226	223
11	354	326	305	291	280	272	265	260	256	253
12	390	361	339	324	313	304	297	292	287	283
13	425	396	374	358	346	336	329	323	318	314
14	461	431	408	392	379	369	362	355	350	346
15	497	466	443	426	413	402	394	387	381	376
16	533	501	478	460	446	436	426	419	413	408

Example

A customer has two WEB applications on their IVR system. The average delay for callers must not exceed two seconds and no more than 5% of callers should encounter a delay in the busy hour (equates to 5% delay Grade Of Service). The typical session duration for IVR_APP_1 is 1 second. The typical session duration for IVR_APP_2 is 2 seconds.

Table 12-19: Example table for GOS P.05

Procedure	Step 1	X Step 2	= Step 3
Application	**Calls in busy hour**	**X Holding time (seconds)**	**Total time (seconds)**
IVR_APP_1	1,500	X 1	1,500 seconds
IVR_APP_2	1,000	X 2	1,000 seconds
Total time			**2,500 seconds or 25 CCS**

The total usage of ports for the two applications is 25 CCS. By referring to Table 12-18 on page 12-35 for 25 CCS, the IVR requires a total of two WEB ports to support the WEB connections.

UPS battery sizing

Symposium OPEN IVR 4.0 supports the following North American (120V) and international (220V) UPS models from APC: SU700, SU1000, and SU2200RM. Table 2-19 on page 2-57 indicates the platform(s) each UPS powers. The SU2200RM UPS is used to protect configurations with up to three MRS/Racks or a combination of two MRS/Racks and one AP/Rack.

Determining on-battery run time

To calculate the on-battery run time first determine the total load protected by the UPS in Volt-Amps (VA).

1 Obtain individual component's current consumption figures at each voltage level in Chapter 6, "Power consumption." Chapter 6 also suggests platform configurations with maximum power consumptions.

2 Add the currents under each voltage level. Multiply the voltage by the total current to get the total wattage for each voltage level.

3 Finally, multiply the value by 1.4 to convert watts to VA (Volt-Amps).

4 Account for the power supply efficiency by increasing the value obtained in step 3 by 13% for Tower AP, MRS/AP, and MRS/Tower, by 20% for R2 MRS/Tower, R2 MRS/Rack, Rack AP, and MRS/Rack, and by 25% if R2 AP or R2 MRS/AP is used.

5 Compare the total load of your system to the run time table below, and find out the expected run time for the system.

Table 12-20: Typical on-battery run time versus load, in minutes

Load (VA)	SU700	SU1000	SU2200RM
50	140	150	366
75	113	125	309
100	85	100	268
150	55	75	209
200	38	58	170
250	26	44	142
300	20	36	121
350	17	28	104
400	14	24	91
450	11	20	80
500	9	18	71
550	8	15	64
600	6	13	57
700	5	11	46
800	-	9	38
900	-	7	32
1000	-	6	27
1200	-	-	21
1400	-	-	17
1600	-	-	14
2000	-	-	10
2200	-	-	8

Sample on-battery run time for Symposium OPEN IVR 4.0 systems

MRS/Tower and MRS/Rack

The tables on the next few pages summarize some typical on-battery run-times for an MRS/Tower and an MRS/Rack, using a SU700. The power consumption of the configurations ranges between 200-320 Watts.

Table 12-21: UPS battery run-time for an MRS/Tower (700tp)

No. of Ports	Time (Minutes)			
	1 disk	2 disks	3 disks	4Disks
12 (LS 4)	52	47	41	36
24 (LS 4)	38	34	30	27
36 (LS 4)	28	25	22	19
48 (LS 4)	20	18	16	14
32 (LS 16)	50	47	44	41
48 (LS 16)	46	42	39	35
96 (LS 16)	16	14	13	12
128 (LS 16)	11	11	10	9
48 (T1)	45	40	35	30
72 (T1)	36	31	26	22
96 (T1)	27	22	17	15
120 (T1)	17	15	13	11
30 (E1)	53	48	43	38
60 (E1)	24	22	20	18
120 (E1)	12	12	10	10

Table 12-22: UPS battery run-time for an MRS/Rack

No. of ports	Time (minutes)			
	1 disk	2 disks	3 disks	4 disks
12 (LS 4)	32	29	27	25
24 (LS 4)	30	27	24	22
36 (LS 4)	24	22	20	18
48 (LS 4)	20	18	17	15
32 (LS 16)	36	33	31	28
48 (LS 16)	31	29	27	25
96 (LS 16)	13	13	12	12
128 (LS 16)	10	10	9	9
48 (T1)	32	29	26	23
72 (T1)	27	25	23	21
96 (T1)	21	19	17	15
120 (T1)	15	14	13	12
30 (E1)	29	27	25	23
60 (E1)	26	24	22	21
120 (E1)	12	11	10	9

Tower AP (700tp) and MRS/AP

The following tables show some typical on-battery run-time for a Tower AP (700 tp) and MRS/AP. The SU700 is used. Power consumptions of the configurations range from 90W to 250W.

Table 12-23: UPS battery run-time for an MRS/AP

No. of ports	Time (minutes)	
	1 disk	2 disks
12 (LS 4)	47	44
24 (LS 4)	33	30
36 (LS 4)	25	22
48 (LS 4)	18	16
32 (LS 16)	45	42
48 (LS 16)	41	38
96 (LS 16)	15	14
128 (LS 16)	13	13
48 (T1)	41	38
72 (T1)	31	28
96 (T1)	24	22
120 (T1)	19	18
30 (E1)	49	47
60 (E1)	22	20
120 (E1)	12	12

Table 12-24: UPS battery run-time for an AP (700tp)

No. of disks	Time (minutes)
1	78
2	75

AP (300tp) and MRS/AP, and AP/Rack

The tables on the next page show some typical on-battery run-time for an AP (300 tp) and MRS/AP, and AP/Rack. The SU700 is used. Power consumptions of the configurations range from 90W to 250W.

Table 12-25: UPS battery run-time for an AP (300tp)

No. of disks	Time (minutes)
1	82
2	77

Table 12-26: UPS battery run-time for an MRS/AP

No. of Ports	Time (minutes)	
	1 disk	2 disks
16 (LS 4)	38	35
32 (LS 16)	52	49
48 (LS 16)	48	45
64 (LS 16)	44	41
48 (T1)	50	47
72 (T1)	46	42
30 (E1)	47	44
60 (E1)	42	39

Table 12-27: UPS battery run-time for an AP/Rack

No. of disks	Time (minutes)
1	82
2	77

R2 MRS/Tower and R2 MRS/Rack

Table 12-28: UPS (SU700) battery run-time for the R2 MRS/Tower and R2 MRS/Rack

No. of hard disks	No. of ports	Time (minutes)
1 disk	48	40
	36	45
	24	52
	12	58
2 disks	48	33
	36	37
	24	40
	12	45
3 disks	48	26
	36	28
	24	32
	12	36

R2 AP and MRS/AP

The tables below show some typical on-battery run-time for the R2 AP and MRS/AP, using a SU1000.

Table 12-29: UPS battery run-time for an R2 AP

No. of hard disks	Time (minutes)
1 disk	73
2 disks	68
3 disks	63
4 disks	58

Table 12-30: UPS battery run-time for R2 MRS/AP

No. of hard disks	No. of ports	Time (minutes)
1 disk	12	48
	24	42
	36	35
	48	30
2 disks	12	35
	24	30
	36	27
	48	23

Chapter 13: Cable connectors and pinouts

Telco interface cable connectors and pinouts

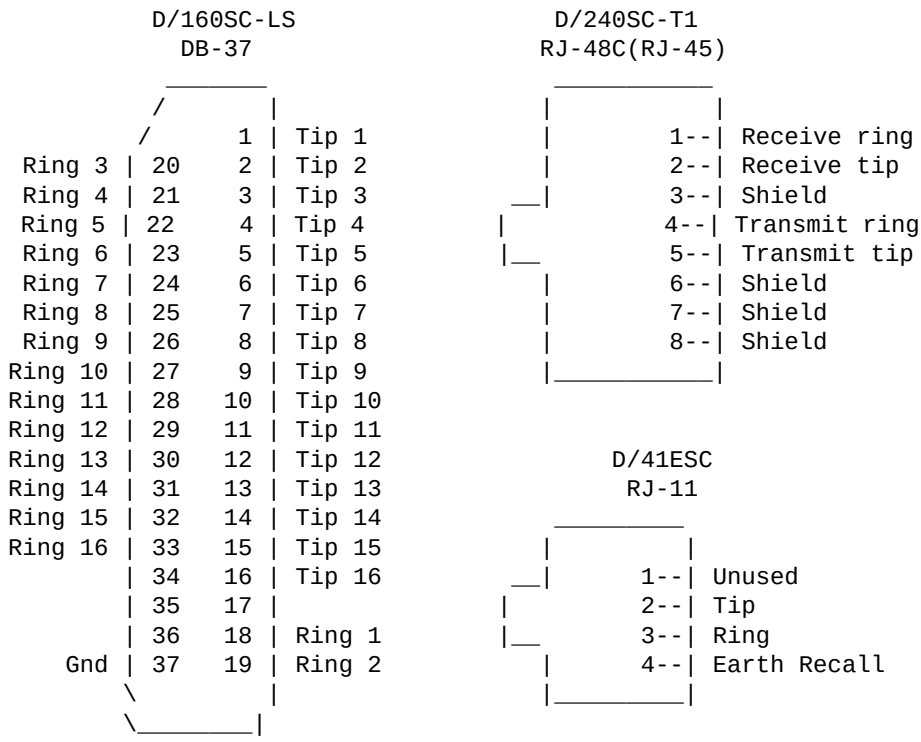
The following diagrams show the network interface connector pin-outs for all of the telephony hardware supported by Symposium OPEN IVR 4.0.

LSI/120
DB-25

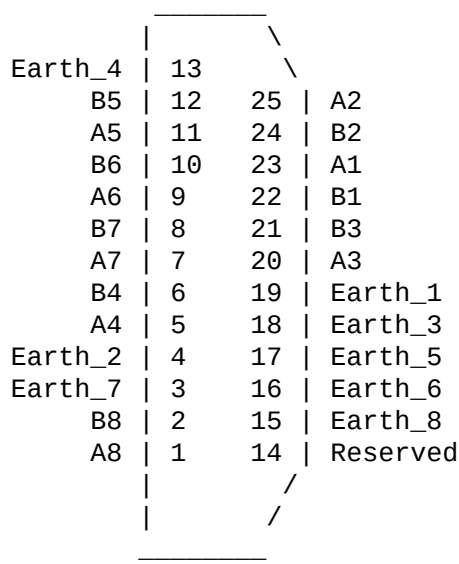
	13	25	Tip 2	Reserved
Ring 5	12			
Tip 5	11	24	Ring 2	
Ring 6	10	23	Tip 1	
Tip 6	9	22	Ring 1	
Ring 7	8	21	Ring 3	
Tip 7	7	20	Tip 3	
Ring 4	6	19	Tip 10	
Tip 4	5	18	Ring 10	
Ring 9	4	17	Tip 11	
Tip 9	3	16	Ring 11	
Ring 8	2	15	Tip 12	
Tip 8	1	14	Ring 12	

LSI/80-UK
DB-25

	13	25	A2	Network Earth
B5	12			
A5	11	24	B2	
B6	10	23	A1	
A6	9	22	B1	
B7	8	21	B3	
A7	7	20	A3	
B4	6	19	Reserved	
A4	5	18	Reserved	
Reserved	4	17	Reserved	
Reserved	3	16	Reserved	
B8	2	15	Reserved	
A8	1	14	Reserved	


D/160SC-LS
DB-37
Ring 3 | 20 2 | Tip 1
Ring 4 | 21 3 | Tip 2
Ring 5 | 22 4 | Tip 3
Ring 6 | 23 5 | Tip 4
Ring 7 | 24 6 | Tip 5
Ring 8 | 25 7 | Tip 6
Ring 9 | 26 8 | Tip 7
Ring 10 | 27 9 | Tip 8
Ring 11 | 28 10 | Tip 9
Ring 12 | 29 11 | Tip 10
Ring 13 | 30 12 | Tip 11
Ring 14 | 31 13 | Tip 12
Ring 15 | 32 14 | Tip 13
Ring 16 | 33 15 | Tip 14
34 16 | Tip 15
35 17 |
36 18 | Ring 1
Gnd | 37 19 | Ring 2
D/240SC-T1
RJ-48C(RJ-45)
1--| Receive ring
2--| Receive tip
3--| Shield
4--| Transmit ring
5--| Transmit tip
6--| Shield
7--| Shield
8--| Shield
D/41ESC
RJ-11
1--| Unused
2--| Tip
3--| Ring
4--| Earth Recall

LSI/80-xx (All except UK)
DB-25



The pinout for 12-port and 8-port loopstart trunk interface cable is as follows.

Table 13-1: LSI/120 loopstart trunk interface cable pinout

25-pin female connector to MRS	Signal	50-pin connector to PSTN
1	RING8	15
2	TIP8	40
3	TIP9	42
4	RING9	17
5	RING4	7
6	TIP4	32
7	RING7	13
8	TIP7	38
9	RING6	11
10	TIP6	36
11	RING5	9
12	TIP5	34
13	RESERVED (LSI/120)	-
14	RING12	23
15	TIP12	48
16	RING11	21
17	TIP11	46
18	RING10	19
19	TIP10	44
20	RING3	5
21	TIP3	30
22	RING1	1
23	TIP1	26
24	RING2	3
25	TIP2	28

Table 13-2: LSI/80 loopstart trunk interface cable pinout

25-pin female connector to MRS	Signal	50-pin connector to PSTN
1	RING8	15
2	TIP8	40
3	RESERVED	42
4	RESERVED	17
5	RING4	7
6	TIP4	32
7	RING7	13
8	TIP7	38
9	RING6	11
10	TIP6	36
11	RING5	9
12	TIP5	34
13	NETWORK EARTH	-
14	RESERVED	23
15	RESERVED	48
16	RESERVED	21
17	RESERVED	46
18	RESERVED	19
19	RESERVED	44
20	RING3	5
21	TIP3	30
22	RING1	1
23	TIP1	26
24	RING2	3
25	TIP2	28

Table 13-3: Loopstart trunk wire pair color-coded pinout (8- and 12-port)

Pair No.	Wire color		50 pin to PSTN	25 pin to MRS	Signal
	Base	Band			
01	Blue	White	01	22	RING1
	White	Blue	26	23	TIP1
02	Green	White	03	24	RING2
	White	Green	28	25	TIP2
03	Slate	White	05	20	RING3
	White	Slate	30	21	TIP3
04	Orange	Red	07	05	RING4
	Red	Orange	32	06	TIP4
05	Black	-	09	11	RING5
	Brown	-	34	12	TIP5
06	Blue	Black	11	09	RING6
	Black	Blue	36	10	TIP6
07	Green	Black	13	07	RING7
	Black	Green	38	08	TIP7
08	Slate	Black	15	01	RING8
	Black	Slate	40	02	TIP8
09	Orange	Yellow	17	04	RING9
	Yellow	Orange	42	03	TIP9
10	Brown	Yellow	19	18	RING10
	Yellow	Brown	44	19	TIP10
11	Blue	Violet	21	16	RING11
	Violet	Blue	46	17	TIP11
12	Green	Violet	23	14	RING12
	Violet	Green	48	15	TIP12

Figure 13-1: Aculab 60-port E1 Rev 5 (75 ohms and 120 ohms).

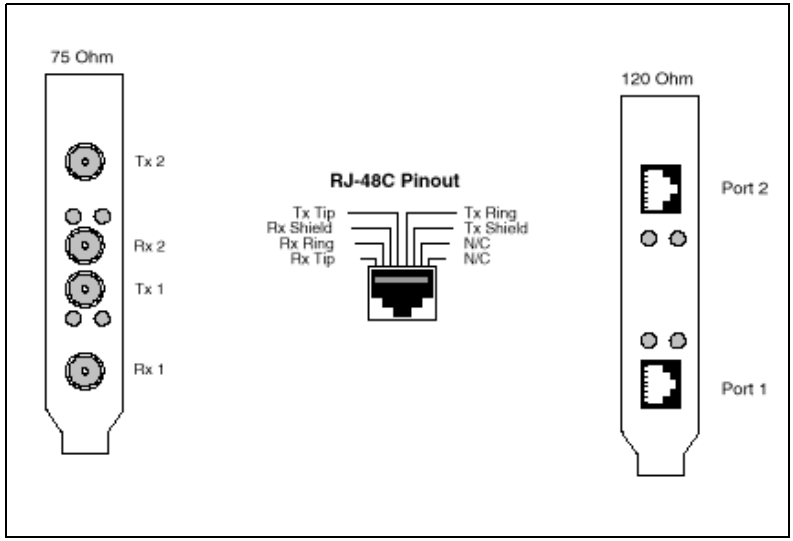


Figure 13-2: Aculab 30-port E1 Rev 5 (75 ohms and 120 ohms)

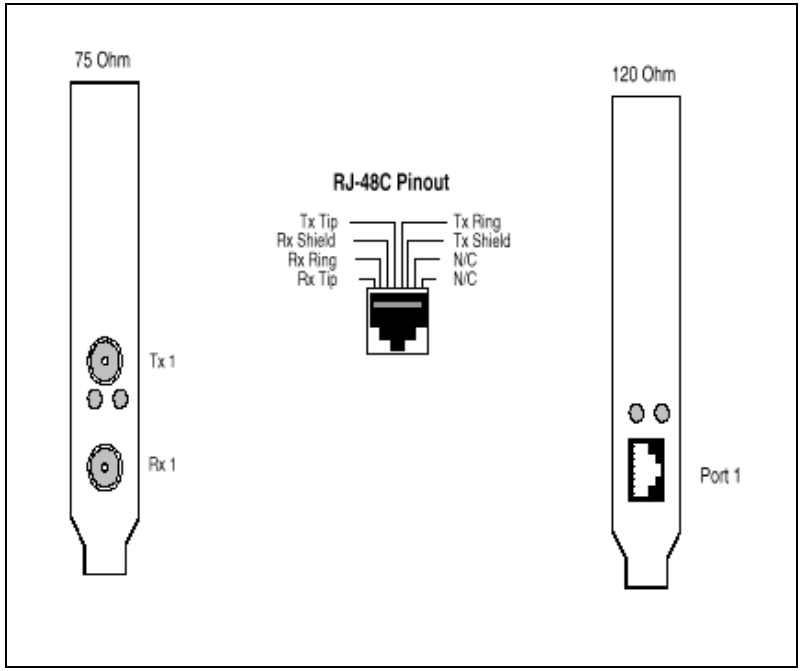


Figure 13-3: Aculab 60-port E1 Rev 4 (75 ohms and 120 ohms)

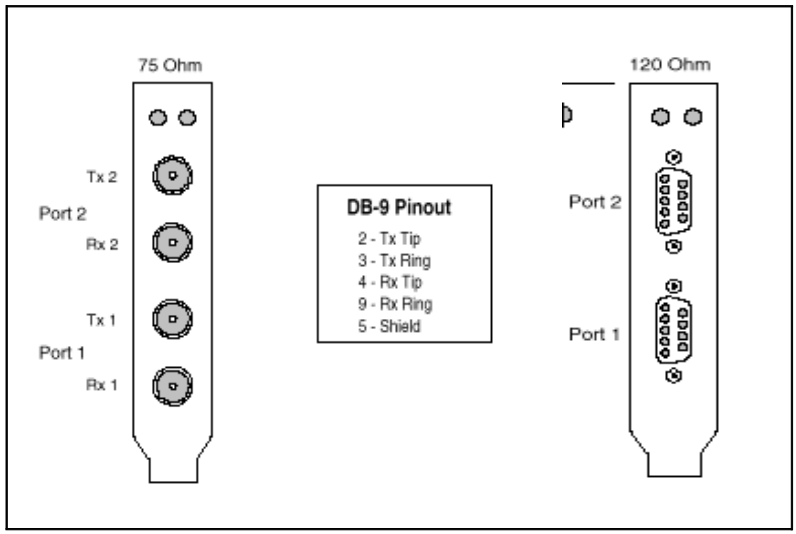
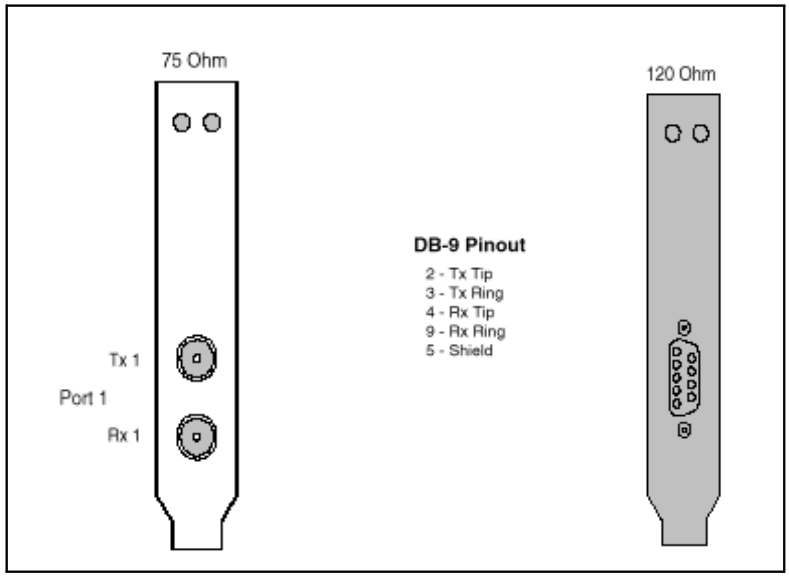


Figure 13-4: Aculab 30-port E1 Rev 4 (75 ohms and 120 ohms)



A ‘cross-over’ cable is required to connect two T1/E1 cards ‘back-to-back’, for example, when one card is to run an exchange end emulation and the other card a user end application. The RJ-45 cable should be wired as follows.

User end		Exchange end
4	connects to	1
5	connects to	2
1	connects to	4
2	connects to	5

PEB Bus Signaling

Table 13-4: PEB Termination

Bus Pin Number	PEB Signal	Network	Resource
1	CLKT	220/330	
2	GND		
3	FSYNCT	220/330	
4	MSYNCT	220/330	
5	SERT	470/680	470/680
6	SIGT	470/680	470/680
7	L_CLKT		220/330
8	GND		
9	L_FSYNCT		220/330
10	L_MYSNCT		220/330
11	L_TSX	470/680	470/680
12	L_SERT	470/680	470/680
13	L_SIGT	470/680	470/680
14	CLKR		220/330
15	GND		
16	FSYNCR		220/330
17	MSYNCR		220/330
18	SERR	470/680	470/680
19	SIGR	470/680	470/680
20	R_CLKT	220/330	
21	GND		
22		220/330	
23		220/330	
24		470/680	470/680
25		470/680	470/680
26		470/680	470/680

Six 220/330 pairs and ten 470/680 pairs are required for each board. Dialogic provides a 20-pin DIP resistor pack (PEB terminator) with these combinations of termination.

SCbus Signaling

Table 13-5: SCbus termination

SCbus Pin #	Signal Name	Termination in Ohms (Pull-up)[a]
1	SCLKx2	22K or 100K
2	GND	
3	SCLK	22K or 100K
4	Reserved	22K or 100K
5	FSYNC	22K or 100K
6	CLKFAIL	4.7K
7	SD0	22K or 100K
8	GND	
9	SD1	22K or 100K
10	SD2	22K or 100K
11	SD3	22K or 100K
12	SD4	22K or 100K
13	SD5	22K or 100K
14	SD6	22K or 100K
15	GND	
16	SD7	22K or 100K
17	SD8	22K or 100K
18	SD9	22K or 100K
19	SD10	22K or 100K
20	SD11	22K or 100K
21	GND	
22	SD12	22K or 100K
23	SD13	22K or 100K
24	SD14	22K or 100K
25	SD15	22K or 100K
26	MC	4.7K

a. For an interface that will only be operated in an SCbus environment, a 22k-ohm resistor is recommended. If the interface is intended to operate in both the SCbus and PEB environment, the 100k-ohm resistors should be used.

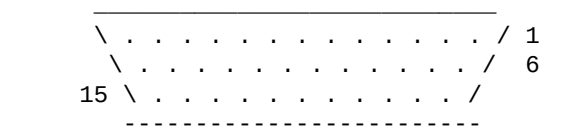
Host communications cable connectors and pinouts

SYNC/570

The cable included in the SYNC/570 package has a DB-15 female connector on the board end, and a DB-25 male connector on the peripheral end.

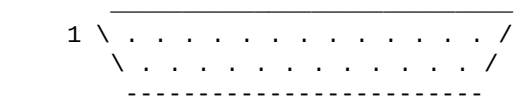
DB-15 female connector and connector pin assignments

The DB-15 connectors are compatible with EIA-232-D devices.



1	Not connected	
2	Transmitted Data (TXD)	Output
3	Received Data (RXD)	Input
4	Request to Send (RTS)	Output
5	Clear to Send (CTS)	Input
6	Data Set Ready (DSR)	Input
7	Signal Ground	
8	Data Carrier Detect (DCD)	Input
17	Receive Clock (RXC)	Input
24	Transmit Clock (TXC)	Output
15	Transmit Clock (TXC)	Input
20	Data Terminal Ready (DTR)	Output
shell	CGND	

DB-25 male connector and connector pin assignments



1	Not connected	
2	Transmitted Data (TXD)	Output
3	Received Data (RXD)	Input
4	Request to Send (RTS)	Output
5	Clear to Send (CTS)	Input
6	Data Set Ready (DSR)	Input
7	Signal Ground	
8	Data Carrier Detect (DCD)	Input
17	Receive Clock (RXC)	Input
24	Transmit Clock (TXC)	Output
15	Transmit Clock (TXC)	Input
20	Data Terminal Ready (DTR)	Output
shell	CGND	

Table 13-6: Arnet cable pinout

DB-37 to host computer	Signal	DB-25 to Arnet SYNC570
2	TXDA0	2
21	TXDB0	14
3	TXCLKAOUT0	24
22	TXCLKBOUT0	11
4	RTS0	4
23	DTR0	20
5	RXDA0	3
24	RXDB0	16
6	RXCLKA0	17
25	RXCLKB0	9
7	TXCLKAIN0	15
26	TXCLKBIN0	12
8	CTS0	5
27	DCD0	8
9	DSR0	6
28	GND	7

PC/Xe and PC/Xem Intelligent Serial Communication Board

PC/Xe uses the DTE octa cable assembly of DB-25 connectors, and can be configured as DTE or DCE devices.

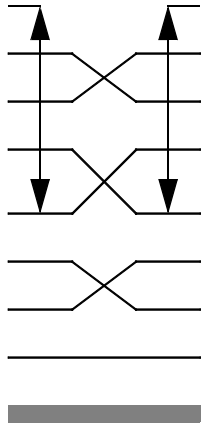
PC/Xem uses the PORTS/16em Asynchronous Connector module, which is equipped with male DTE-wired DB-25 connectors. Table 13-7, “Connecting cable pin assignments,” on page 13-16 shows the DB-25 connector pin assignments.

A null modem cable is needed to connect one outlet of the octa cable assembly of PC/Xe, or one connector of the PORTS/16 Module to the VT100 host computer's serial port. Table 13-8, "Null modem cable 9-pin to 25-pin," on page 13-17 shows the connecting cable pin assignments.

Table 13-7: Connecting cable pin assignments

Signal	Description	DTE use	Pin #
GND	Chassis Ground	N/A	Shell
TxD	Transmitted Data	Output	2
RxD	Received Data	Input	3
RTS	Request to Send	Output	4
CTS	Clear to Send	Input	5
DSR	Data Set Ready	Input	6
SG	Signal Ground	reference	7
DCD	Data Carrier Detect	Input	8
DTR	Data Terminal Ready	Output	20
RI	Ring Indicator	Input	22

Table 13-8: Null modem cable 9-pin to 25-pin

DB-9 connector end			DB-25 connector end	
Signal	**Pin**		**Pin**	**Signal**
DCD	1		8	DCD
RxD	2		3	RxD
TxD	3		2	TxD
DTR	4		20	DTR
DSR	6		6	DSR
RTS	7		4	RTS
CTS	8		5	CTS
SG	5		7	SG
GND	Shell		1	GND
RI	9		22	RI

cable shield

Alarm port pinout on R2 MRS/Rack

For an external alarm system, you can signal Major and Minor alarms by connecting the system to the R2 MRS/Rack using a cable which matches with the Alarm port on the rear panel. The following table lists the pinouts for this 15-pin, subminiature-D connector.

Table 13-9: R2 MRS/Rack alarm connector pinouts for external cabling

Pin #	Signal	State
1	Not Used	
2	Major #2	Normally Closed (NC)
3	Major #2	Normally OPEN (NO)
4	Major #2	Common (COM)
5	Minor #2	Normally OPEN (NO)
6	Minor #2	Normally Closed (NC)
7	Minor #2	Common (COM)
8	Not Used	
9	Not Used	
10	Major #1	Normally Closed (NC)
11	Major #1	Normally OPEN (NO)
12	Major #1	Common (COM)
13	Minor #1	Normally OPEN (NO)
14	Minor #1	Normally Closed (NC)
15	Minor #1	Common (COM)

UPS port pinout on R2 MRS/Rack

A proprietary interface cable is required.

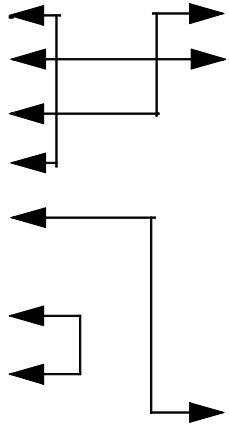
Table 13-10: R2 MRS/Rack UPS connection pinouts

Signal	MRS/Rack UPS port pin number		UPS comm port pin number	Signal
not used	1		1	not used
not used	2		2	not used
AC FAIL	3		3	AC FAIL
GND	4		4	COM
BAT LOW	5		5	BAT LOW
not used	6		6	not used
not used	7		7	not used
not used	8		8	not used
not used	9		9	GROUND

UPS communication cable pinouts from APC

This cable is used in all platforms in Symposium OPEN IVR 4.0 except R2 MRS/Tower and R2 MRS/Rack. This cable connects the UPS to the standard serial port (COM port 1 or 2) of these systems.

Table 13-11: UPS cable pinout from APC

DB9 female to COM port 1 or 2		DB9 male to UPS
1		1
2		2
3		3
4		4
5		5
6		6
7		7
8		8
9		9

Modem cable pinout

The standard 9-pin to 25-pin modem cable is used. The following table shows the cable pinout assignments (straight through).

Table 13-12: Modem cable pinout assignments

Signal	DB-9 female pin #	DB-25 male pin #
DCD	1	8
RxD	2	3
TxD	3	2
DTR	4	20
SG	5	7
DSR	6	6
RTS	7	4
CTS	8	5
RI	9	22
GND*	Shell	1

*Cable Shield

Chapter 14: Components, spares, and MTBF values

Tower AP (300tp) component number and MTBF values

Base platform hardware

Table 14-1: Tower AP base platform component part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Base chassis	Includes 1 TEAC Fd-235 Floppy drive, TT14-NOR-01 chassis assembly, SP2-44400FA 400 watt power supply, Dual Input Papst cooling fan, shock mount drive bay for three 3.5" devices, and two 5.25" devices, front opening input filter device, locking drive door, and locking side/rear panel. 14-slot (8 ISA/ 4PCI/ 2CPU) passive backplane	A0686371	70
System CPU board	It includes Pentium P5-233 PCI/ISA SBC with 512kbyte Synchronous Pipeline Burst L2 cache, PS/2 keyboard and mouse connectors, 2 serial and 1 parallel connectors.	A0737757	100
DRAM	32-Mbyte SIMM RAM	A0726884	2034
SVGA monitor	14" monitor extended VGA	A0651330	
	17" non-interlace.27mmpitch	A0638465	30
	21" non-interlace.25mm pitch	A0732344	30
Video card	STB Power Graph 64 video card	A0724209	

Component	Description	NT part number	MTBF (kHour)
SCSI Controller	PCI SCSI controller with SCSI cable for 4 devices	A0686306	495
Hard drive	4 Gbyte 16-bit Ultra SCSI hard disk	A07299	
Tape drive	3.5” SCSI DAT tape drive	A0681579	100
CD ROM drive	SCSI CD-ROM drive	A0737759	100
Mouse	3 button PS/2 type mouse	A0651329	150
Keyboard	101 enhanced keyboard	A0663339	40
Keylock	Parallel port License Manager security keylock	A0731666	
SCSI adapter	F/F wide-to-narrow SCSI adapter	A0684822	
Nortel logo	Nortel logo front panel	P0866247	N/A

Network (LAN) hardware

Table 14-2: Tower AP Network (LAN) component part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Ethernet	PCI 10-MByte Ethernet card	A0678623	175
Token Ring	ISA Token Ring network card	A0639229	138
Connector	Ethernet Tee Connector (thinnet)	A0368824	N/A

Host connectivity hardware

Table 14-3: Tower AP (300tp) host connectivity component part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Host connectivity component	ISA Asynchronous Communications Board, 16 ports module	A0731331	247
	ISA SYNC/570 synchronous data link communication card with cable	A0652638	597
	ISA Token Ring communication board (SNA over Token Ring)	A0639229	138
Expansion module	16 Async ports expansion module for Digi PC/Xem port module	A0731719	

Peripheral hardware

Table 14-4: Tower AP (300tp) peripheral component part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Uninterruptible power supply	Uninterruptible power supply with software and cable Smart (700VAC, 110V)	A0656296	35
	Uninterruptible power supply with software and cable Smart (700VAC, 110V)	A0731708	35
Modem	33.6 Kbps external modem	A0674453	100

Cables

Table 14-5: Tower AP (300tp) cable part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Network (LAN) cable	Ethernet cable - 25 feet Cat 5	A0648379	
	Ethernet cable (thinnet 50 Ft) and terminator	A0401604	
SCSI cable	Wide SCSI cable 68 pin	A0684753	
Monitor cables	PS/2/VGA cable 2 meter (All supported monitors)	A0725836	
	PS/2/VGA cable 4 meter (All supported monitors)	A0725837	

MRS/AP component number and MTBF values

Base platform hardware

Refer to Table 14-1, “Tower AP base platform component part numbers and MTBF values,” on page 14-1.

Network (LAN) hardware

Refer to Table 14-2, “Tower AP Network (LAN) component part numbers and MTBF values,” on page 14-2.

Host connectivity hardware

Refer to Table 14-3, “Tower AP (300tp) host connectivity component part numbers and MTBF values,” on page 14-3.

Peripheral hardware

Table 14-6: MRS/AP peripheral component part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Uninterruptible power supply	Uninterruptible power supply with software and cable Smart (700VAC, 110V)	A0656296	35
	Uninterruptible power supply with software and cable Smart (700VAC, 110V)	A0731708	35
Modem	33.6 Kbps external modem	A0674453	100

Telephony hardware

Table 14-7: MRS/AP (300tp) telephony component part numbers and MTBF values

Component	Description	Revision number	NT part number	MTBF (kHour)
Telco interface and Voice processing hardware	D/41ESC-NA 4 -Port high Density loopstart card used in North America		A0657617	762
	D/41ESC-FR 4 -Port high Density loopstart card used in France		A0731170	762
	D/41ESC-DE 4 -Port high Density loopstart card used in Germany		A0731238	762
	D/41ESC-DK 4 -Port high Density loopstart card used in Denmark		A0731242	762
	D/41ESC-ES 4 -Port high Density loopstart card used in Spain		A0731245	762
	D/41ESC-AT 4 -Port high Density loopstart card used in Austria		A0731248	762
	D/41ESC-BE 4 -Port high Density loopstart card used in Belgium		A0731249	762
	D/41ESC-NO 4 -Port high Density loopstart card used in Norway		A0731251	762
	D/41ESC-FI 4 -Port high Density loopstart card used in Finland		A0731252	762
	D/41ESC-UK 4 -Port high Density loopstart card used in United Kingdom		A0680380	762

Component	Description	Revision number	NT part number	MTBF (kHour)
	D/41ESC-IT 4 -Port high Density loopstart card used in Italy		A0680434	762
	D/41ESC-NL 4 -Port high Density loopstart card used in Holland		A0684247	762
	D/41ESC-SE 4 -Port high Density loopstart card used in Sweden		A0680432	762
	D/41ESC-IE 4 -Port high Density loopstart card used in Ireland		A0680433	762
	D/160SC-LS 16 -Port high Density loopstart card used in North America	2	A0731171	153
	D/160SC-LS-IDPD 16-Port high Density loopstart cad with DPD, used in North America		A0731263	153
	D/240SC-T1 24-Port Voice/Network card	2	A0650990	309
Telco interface hardware	30-Port Digital access card, 120 ohms, RJ45		A0731454	520
	30-Port Digital access card, 75 ohms, BNC		A0731433	520
	60-Port Digital access card, 120 ohms, RJ45		A0731462	350
	60-Port Digital access card, 75 ohms, BNC		A0731452	350
	Daughter card (CAS) for 30 port E1 board		A0731488	

Component	Description	Revision number	NT part number	MTBF (kHour)
	Daughter card (CAS) for 60 port E1 board		A0731497	
Voice processing hardware	D/320 32-Port Voice processing card	2	A0657620	331
	D/320 32-Port Voice processing card with DPD		A0731264	331
Text To Speech and Speech Recognition hardware	General Purpose 50MHz DSP board		A0674588	883
	Dongle-Antares 2000/50, for VCS Continuous speech recognition with cut-through		A0731665	
	Dongle-Antares 2000/50, for VCS Discrete speech recognition with cut-through		A0674588	
	Dongle-Antares 2000/50, for L&H Text-To-Speech		A0731652	
	Dongle-Antares 2000/50, for TruVoice Text-To-Speech		A0731657	
Fax hardware	4 Port GammaLink Fax board		A0731651	195
	6 Port GammaLink Fax board		A0731655	247
	12 Port GammaLink Fax board		A0731656	130

Cables

Table 14-8: MRS/AP cable part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Network (LAN) cable	Ethernet cable - 25 feet Cat 5	A0648379	
	Ethernet cable (thinnet 50 Ft) and terminator	A0401604	
SCSI cables	Wide SCSI cable 68 pin	A0684753	
Monitor cables	PS/2/VGA cable 2 meter (All supported monitors)	A0725836	
	PS/2/VGA cable 4 meter (All supported monitors)	A0725837	
Telephony cables	SCbus ribbon cable - 16 connector	A0732281	
	Cable for D/160SC-LS card	A0732794	

AP (700tp) Component number and MTBF values

Base platform hardware

Table 14-9: AP (700tp) base platform component part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Base chassis	It includes floppy drive FD-235, 6220p chassis, 350W power supply, 20 slot 3PCU/16ISA/1CPU passive backplane and 3xfans	A0686304	
System CPU board	It includes P233MHz PCI/ISA SBC and 512KB L2 cache and wide SCSI II connector board with floppy cable, IDE cable, serial port2 and PS2 mouse harness, keyboard adapter 5pin-to-Ps/2 and freezed BIOS v4.05	A0735228	
DRAM	64 Mbyte DRAM (32 Mbyte 60 ns SIMM x2)	A0684497	2034
SVGA monitor	14” monitor extended VGA	A0651330	30
	17” non-interlace.27mm pitch	A0638465	30
	21” non-interlace.25mm pitch	A0732344	30
Video card	STB Power Graph 64 video card	A0724209	
Hard drive	4.0-Gbyte 16-bit Ultra SCSI hard disk	A0729948	
Tape drive	3.5” SCSI DAT tape drive	A0681579	100
CD ROM drive	SCSI CD-ROM drive	A0737759	100
Mouse	3-button PS/2 type mouse	A0651329	150
Keyboard	101 Enhanced Keyboard	A0663339	40
Keylock	Parallel port License Manager security keylock	A0731666	
Adapter	F/F wide-to-narrow SCSI adapter	A0684822	
	AT to PS/2 Keyboard cable adapter	A0685300	
Nortel Logo	Nortel logo front panel	P0866247	N/A

Network (LAN) hardware

Refer to Table 14-2, “Tower AP Network (LAN) component part numbers and MTBF values,” on page 14-2.

Host connectivity hardware

Refer to Table 14-3, “Tower AP (300tp) host connectivity component part numbers and MTBF values,” on page 14-3.

Peripheral hardware

Refer to Table 14-6, “MRS/AP peripheral component part numbers and MTBF values,” on page 14-5.

Cables

Refer to Table 14-5, “Tower AP (300tp) cable part numbers and MTBF values,” on page 14-4.

MRS/AP (700tp) component number and MTBF values

Base hardware

Refer to Table 14-9, “AP (700tp) base platform component part numbers and MTBF values,” on page 14-10.

Network (LAN) hardware

Refer to Table 14-2, “Tower AP Network (LAN) component part numbers and MTBF values,” on page 14-2.

Host connectivity hardware

Refer to Table 14-3, “Tower AP (300tp) host connectivity component part numbers and MTBF values,” on page 14-3.

Peripheral hardware

Refer to Table 14-6, “MRS/AP peripheral component part numbers and MTBF values,” on page 14-5.

Cables

Refer to Table 14-5, “Tower AP (300tp) cable part numbers and MTBF values,” on page 14-4.

Telephony hardware

Refer to Table 14-7, “MRS/AP (300tp) telephony component part numbers and MTBF values,” on page 14-6

MRS/Tower Component number and MTBF values

Base platform hardware

Table 14-10: MRS/Tower base platform component part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Base chassis	It includes floppy drive FD-235, 6220p chassis, 350W power supply, 20 slot 3PCU/16ISA/1CPU passive backplane and 3xfans	A0686304	
System CPU board	It includes P233MHz PCI/ISA SBC and 512KB L2 cache and wide SCSI II connector board with floppy cable, IDE cable, serial port2 and PS2 mouse harness, keyboard adapter 5pin-to-Ps/2 and freezed BIOS v4.05	A0735228	
DRAM	64 Mbyte DRAM (32 Mbyte 60 ns SIMM x2)	A0684497	2034
SVGA monitor	14” monitor extended VGA	A0651330	30
	17” non-interlace.27mm pitch	A0638465	30
	21” non-interlace.25mm pitch	A0732344	30
Video card	STB Power Graph 64 video card	A0724209	
Hard drive	4.0-Gbyte 16-bit Ultra SCSI hard disk	A0729948	
Tape drive	3.5” SCSI DAT tape drive	A0681579	100
CD ROM drive	SCSI CD-ROM drive	A0737759	100
Mouse	3-button PS/2 type mouse	A0651329	150
Keyboard	101 Enhanced Keyboard	A0663339	40
Keylock	Parallel port License Manager security keylock	A0731666	
Adapter	F/F wide-to-narrow SCSI adapter	A0684822	
	AT to PS/2 Keyboard cable adapter	A0685300	
Nortel Logo	Nortel logo front panel	P0866247	N/A

Network (LAN) hardware

Refer to Table 14-2, “Tower AP Network (LAN) component part numbers and MTBF values,” on page 14-2.

Peripheral hardware

Refer to Table 14-6, “MRS/AP peripheral component part numbers and MTBF values,” on page 14-5.

Cables

Refer to Table 14-5, “Tower AP (300tp) cable part numbers and MTBF values,” on page 14-4.

Telephony hardware

Refer to Table 14-7, “MRS/AP (300tp) telephony component part numbers and MTBF values,” on page 14-6

Rack AP (1000rp) Component number and MTBF values

Base platform hardware

Table 14-11: Rack AP base platform component part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Base chassis (AC power)	It includes floppy drive FD-235, 5520p Rackmount chassis with 3PCI/1CPU/16 ISA passive backplane, AC power supply, dual H/S fans, 3-5.25” drive and 1-3.5” bays, manual and power cable, three hot swappable drive SCSI array, alarm display LED, SR-8 rack slide kit and 400W AC power supply	A0683163	75
Base chassis (DC power)	It includes floppy drive FD-235, 5520p Rackmount chassis with 3PCI/1CPU/16 ISA passive backplane, AC power supply, dual H/S fans, 3-5.25” drive and 1-3.5” bays, manual and power cable, three hot swappable drive SCSI array, alarm display LED, SR-8 rack slide kit and DC power supply	A0723644	100
System CPU board	It includes P233MHz PCI/ISA SBC and 512-Kbyte L2 cache and wide SCSI II connector board with floppy cable, IDE cable, serial port2 and PS2 mouse harness, keyboard adapter 5pin-to-Ps/2 and freezed BIOS v4.05	A0735228	100
DRAM	64-Mbyte DRAM (32-Mbyte 60 ns SIMM x2)	A0684497	2034
SVGA monitor	14” monitor extended VGA	A0651330	30
	17” non-interlace.27mm pitch	A0638465	30
	21” non-interlace.25mm pitch	A0732344	30
Video card	STB Power Graph 64 video card	A0724209	
Hard drive	4 Gbyte SCSI SCA hard disk (Hot Swap)	A0737612	
Tape drive	3.5” SCSI DAT tape drive	A0681579	100

Component	Description	NT part number	MTBF (kHour)
CD ROM drive	SCSI CD-ROM drive	A0729948	100
Mouse	3-button PS/2 type mouse	A0651329	150
Keyboard	101 Enhanced Keyboard	A0663339	40
Keylock	Parallel port License Manager security keylock	A0731666	
Adapter	F/F wide-to-narrow SCSI adapter	A0684822	
	AT to PS/2 Keyboard cable adapter	A0685300	
Brackets	5.25” Hard drive brackets(for the third and fourth hard disks)	A0685300	
Nortel Logo	Nortel logo front panel	P0866247	

Network (LAN) hardware

Refer to Table 14-2, “Tower AP Network (LAN) component part numbers and MTBF values,” on page 14-2.

Host connectivity hardware

Refer to Table 14-3, “Tower AP (300tp) host connectivity component part numbers and MTBF values,” on page 14-3.

Peripheral hardware

Table 14-12: Rack AP (1000rp) peripheral component part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Uninterrupt-ible Power Supply	Uninterruptible power supply with software and cable Smart (700VAC, 110V)	A0656296	35
	Uninterruptible power supply with software and cable Smart (700VAC, 110V)	A0731708	35
	Uninterruptible power Supply with software and cable Smart (2200VAC, 110V)	A0731712	
	Uninterruptible power supply with software and cable Smart (2200VAC, 220V)	A0731713	
	Uninterruptible power supply - ShareUPS	A0731719	
Modem	33.6 Kbps external modem	A0674453	100
Cabinet	Cabinet for MRS/RACK - 21 inch	A0720967	
	Front or rear door kit for cabinet	A0678546	N/A
	Power bar - 6 outlets - 2 meter cable	A0727289	
	System peripheral switch - 8 way	A0722439	
	19” Rackmount monitor enclosure	A0722445	N/A
	Rackmount keyboard drawer	A0722967	N/A
	DC power supply for cabinet	A0676108	
	DC power cable for PS400-48 power supply	A0725949	
	48 VDC to 120 VAC static inverter	A0679302	

Cables

Table 14-13: Rack AP cable part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Network (LAN) cable	Ethernet cable - 25 feet Cat 5	A0648379	
	Ethernet cable (thinnet 50 Ft) and terminator	A0401604	
SCSI cable	Wide SCSI cable 68 pin	A0684753	
Monitor cables	PS/2/VGA cable 2 meter (All supported monitors)	A0725836	
	PS/2/VGA cable 4 meter (All supported monitors)	A0725837	
Power cable	DC power cable for PS400-48 power supply	A0725949	

Spares

Table 14-14: Rack AP spares part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Spares	Front or rear door kit for cabinet	A0678546	
	Power bar - 6 Outlets - 2 meter cable	A0727289	
	System peripheral switch - 8 way	A0722439	
	19” Rackmount monitor enclosure	A0722445	
	VGA monitor cable -2 Meters	A0725836	
	VGA monitor cable -4 Meters	A0725837	
	Rackmount keyboard drawer	A0722967	
	DC power supply for cabinet	A0676108	
	DC power cable for PS400-48 power supply	A0725949	
	48VDC to 120 VAC static inverter	A0679302	
	Base chassis for MRS/RACK - AC power	A0683163	
	Base chassis for MRS/RACK - DC power	A0723644	

MRS/Rack Component number and MTBF values

Base platform hardware

Refer to Table 14-10, “MRS/Tower base platform component part numbers and MTBF values,” on page 14-13.

Network (LAN) hardware

Refer to Table 14-2, “Tower AP Network (LAN) component part numbers and MTBF values,” on page 14-2.

Peripheral hardware

Refer to Table 14-12, “Rack AP (1000rp) peripheral component part numbers and MTBF values,” on page 14-17.

Telephony hardware

Refer to Table 14-7, “MRS/AP (300tp) telephony component part numbers and MTBF values,” on page 14-6.

Cables

Table 14-15: MRS/Rack cable part numbers and MTBF values

Component	Description	NT part number	MTBF (kHour)
Network (LAN) cable	Ethernet cable - 25 feet Cat 5	A0648379	
	Ethernet cable (thinnet 50 Ft) and terminator	A0401604	
SCSI cables	Wide SCSI cable 68 pin	A0684753	
Monitor cables	PS/2/VGA cable 2 meter (All supported monitors)	A0725836	
	PS/2/VGA cable 4 meter (All supported monitors)	A0725837	
Telephony cables	SCbus ribbon cable - 16 connector	A0732281	
	Cable for D/160SC-LS card	A0732794	
Power cable	DC power cable for PS400-48 Power supply	A0725949	

System MTBF Values

MTBF Values of Base Platforms

The following components are included in determining the MTBF values of the base platforms: power supply, CPU board, RAM, hard drive, SCSI controller board (for R2 MRS/Tower, R2 MRS/Rack, and Tower AP only), and LAN boards.

Table 14-16: Platform MTBF values

Base platform	FIT (Failure in Time)	MTBF	
		in hours	in years
R2 MRS/Tower, one 1-Gbyte disk	15,793	63,319	7.23
R2 MRS/Tower, 1-Gbyte disk mirroring (1 pair)	14,993	66,698	7.61
R2 MRS/Tower, one 2-Gbyte disk	13,460	74,294	8.48
R2 MRS/Rack, one 1-Gbyte disk, one power supply	15,793	63,319	7.23
R2 MRS/Rack, one 1-Gbyte disk, two power supplies	14,406	69,415	7.92
R2 MRS/Rack, 1-Gbyte disk mirroring (1 pair), one power supply	14,993	66,698	7.61
R2 MRS/Rack, 1-Gbyte disk mirroring (1 pair), two power supplies	13,606	73,497	8.39
R2 MRS/Rack, one 2-Gbyte disk	13,460	74,294	8.48
R2 AP and MRS/AP, one 1-Gbyte disk	20,932	38,563	5.45
R2 AP and MRS/AP, 1-Gbyte disk mirroring (1 pair)	50,171	39,790	5.72
Tower AP and MRS/AP, one 2-Gbyte disk	19,003	52,622	6.01
Tower AP and MRS/AP, disk mirroring	18,003	55,546	6.34
MRS/Tower, one 2-Gbyte disk	15,755	63,471	7.25
MRS/Tower, disk mirroring (1 pair)	14,755	67,773	7.74
Rack AP and MRS/Rack, one 2-Gbyte disk, one power supply[a]	15,755	63,471	7.25

Base platform	FIT (Failure in Time)	MTBF	
		in hours	in years
Rack AP and MRS/Rack, one 2-Gbyte disk, two power supplies	14,755	67,773	7.74
Rack AP and MRS/Rack, disk mirroring (1 pair), one power supply	14,755	67,773	7.74
Rack AP and MRS/Rack, disk mirroring (1 pair), two power supplies	13,755	72,700	8.30

a. MTBF values of the AC and DC power supplies are identical.

Method in determining system MTBF

To determine the system MTBF, follow these steps.

1 Obtain the FIT of the base platform from Table 14-16, “Platform MTBF values,” on page 14-22, as well as the FIT of each additional telephony or host communication board in Table 14-7, “MRS/AP (300tp) telephony component part numbers and MTBF values,” on page 14-6 and Table 14-3, “Tower AP (300tp) host connectivity component part numbers and MTBF values,” on page 14-3 respectively.

2 To convert FIT into equivalent MTBF values, use the following formula:

MTBF = 1000000000/FIT

3 To obtain the system MTBF, use the following formula:

System MTBF = 1000000000/(Base Platform FIT + sum of all option cards’ FITs)

where option cards include any telephony and host connectivity boards.

Example

As an example, consider a 72-port T1 with 24 port fax MRS/Tower which consists of three T1 boards and two 12-port fax boards.

From“Base platform hardware” on page 14-10, FIT of MRS/Tower = 15,755

From “Host connectivity hardware” on page 14-3, MTBF of a T1 board = 309,000 hours

FIT of a T1 board = 1000000000/309000 = 3236

Similarly, FIT of fax board = 1000000000/130000 = 7692

System MTBF=1000000000/(15755+3*3236+2*7692)

= 24481 hours or 2.79 years

Sample system MTBF values

The chart on the next page shows the system MTBF values for T1 SCbus platform configurations. Not all configurations are included. In reality there are many more possible configurations.

The results can also be graphed to show the effect on system MTBF of installing more ports and adding optional features like fax or TTS.

Table 14-17: System MTBF values for T1 SCbus platform configurations

System Reliability for T1 systems								
Failure Rates								
300tp-1	300tp-2	700tp-1	700tp-2	1000rp-1	1000rp-2	1000rp-3	CP/6-SC	CP/12-SC
19,003	18,003	15,755	14,755	15,755	14,755	13,755	4,041	7,671
24 T1	Antares							
3,241	1,132							
System MTBF in hours (no option cards)								
Trunks	300tp-1	300tp-2	700tp-1	700tp-2	1000rp-1	1000rp-2	1000rp-3	
0	52,623.270	55,546.298	63,471.914	67,773.636	63,471.914	67,773.636	72,700.836	
24	44,955.943	47,072.114	52,642.662	55,567.904	52,642.662	55,567.904	58,837.373	
48	39,238.768	40,841.331	44,970.095	47,087.630	44,970.095	47,087.630	49,414.439	
72	34,811.669	36,067.229	39,249.549	40,853.011	39,249.549	40,853.011	42,593.066	
96	31,282.260	32,292.440	34,820.154	36,076.338	34,820.154	36,076.338	37,426.550	
120	28,402.636	29,232.928	31,289.111	32,299.742	31,289.111	32,299.742	33,377.837	
System MTBF in hours (with option cards)								
Trunks, Options		300tp-1	300tp-2	700tp-1	700tp-2	1000rp-1	1000rp-2	1000rp-3
24, 6 fax, Ant		36,473.721	37,854.412	41,375.315	43,161.120	41,375.315	43,161.120	45,108.034
48, 12 fax, Ant		29,164.722	30,040.856	32,216.495	33,288.948	32,216.495	33,288.948	34,435.262
72, 24 fax, Ant		22,123.894	22,624.434	23,836.766	24,418.832	23,836.766	24,418.832	25,030.036
96, 24 fax, Ant		20,643.670	21,078.814	22,127.321	22,628.018	22,127.321	22,628.018	23,151.900
120, 24 fax, Ant		19,349.096	19,730.871	20,646.653	21,081.924	20,646.653	21,081.924	21,535.943
120, 48 fax, 2 Ant		n/a*	n/a*	15,406.421	15,647.493	15,406.421	15,647.493	15,896.229
120, 60 fax, 4 Ant		n/a*	n/a*	13,361.303	13,542.245	13,361.303	13,542.245	13,728.155
* Total number of cards required exceeds the maximum number of available slots in a MRS/AP.								
System MTBF in years (no option cards)								
Trunks	300tp-1	300tp-2	700tp-1	700tp-2	1000rp-1	1000rp-2	1000rp-3	
0	6.0	6.3	7.2	7.7	7.2	7.7	8.3	
24	5.1	5.4	6.0	6.3	6.0	6.3	6.7	
48	4.5	4.7	5.1	5.4	5.1	5.4	5.6	
72	4.0	4.1	4.5	4.7	4.5	4.7	4.9	
96	3.6	3.7	4.0	4.1	4.0	4.1	4.3	
120	3.2	3.3	3.6	3.7	3.6	3.7	3.8	

Table 14-18: System MTBF values for T1 SCbus platform configurations (continued)

System MTBF in years (with option cards)							
Trunks, Options	300tp-1	300tp-2	700tp-1	700tp-2	1000rp-1	1000rp-2	1000rp-3
24, 6 fax, Ant	1.88	1.91	2.05	2.09	2.18	2.70	2.77
48, 12 fax, Ant	1.69	1.71	1.83	1.86	1.93	2.32	2.37
72, 24 fax, Ant	1.45	1.47	1.56	1.58	1.63	1.90	1.93
96, 24 fax, Ant	1.40	1.41	1.49	1.51	1.56	1.80	1.83
120, 24 fax, Ant	1.34	1.36	1.43	1.45	1.49	1.72	1.74
120, 48 fax, 2 Ant	n/a*	n/a*	1.15	1.16	1.19	1.33	1.34
120, 60 fax, 4 Ant	n/a*	n/a*	0.99	1.00	1.02	1.12	1.13

*Total number of cards required exceeds the maximum number of available slots in a MRS/AP.

Key			
300tp-1	MRS/AP, 1-2 GB Disk	1000rp-1	MRS/Rack, 1 power supply, 1-2GB Disk
300tp-2	MRS/AP, 2 Disk Mirroring	1000rp-2	MRS/Rack, 2 power supply, 1-2GB Disk
700tp-1	MRS/Tower, 1-2 GB Disk	1000rp-3	MRS/Rack, 2 power supply, 2 Disk Mirroring
700tp-2	MRS/Tower, 2 Disk Mirroring		

Figure 14-1: SCbus-based T1 system reliability with *no* option cards

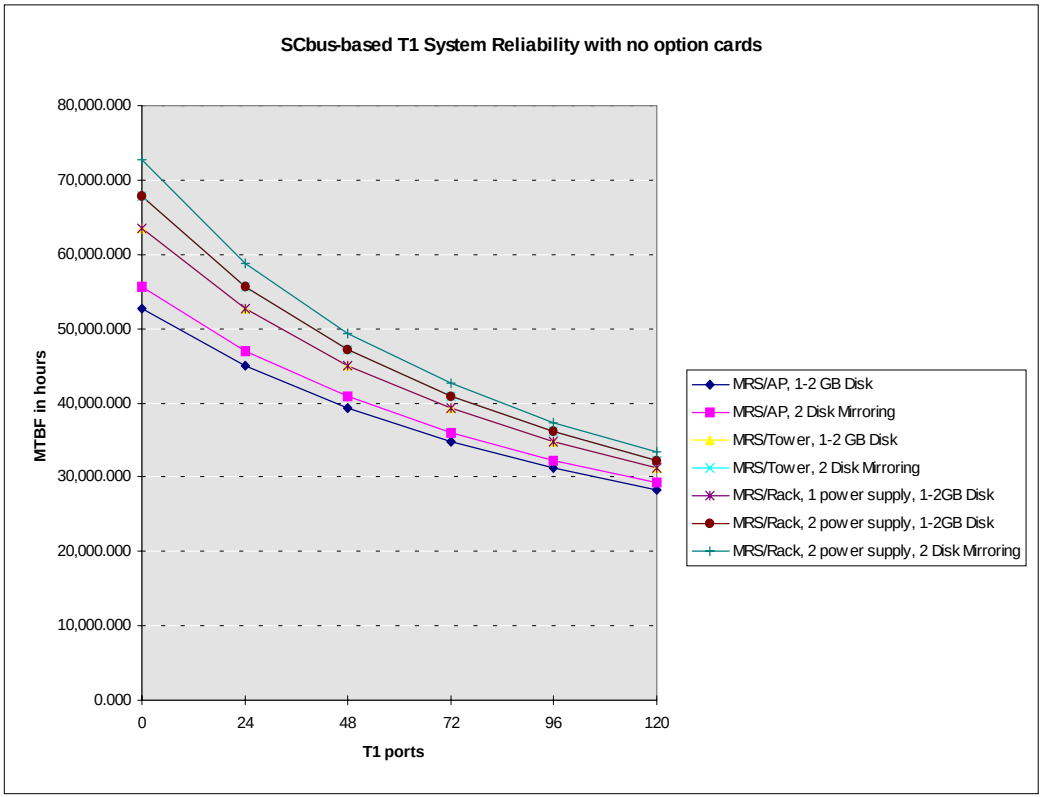
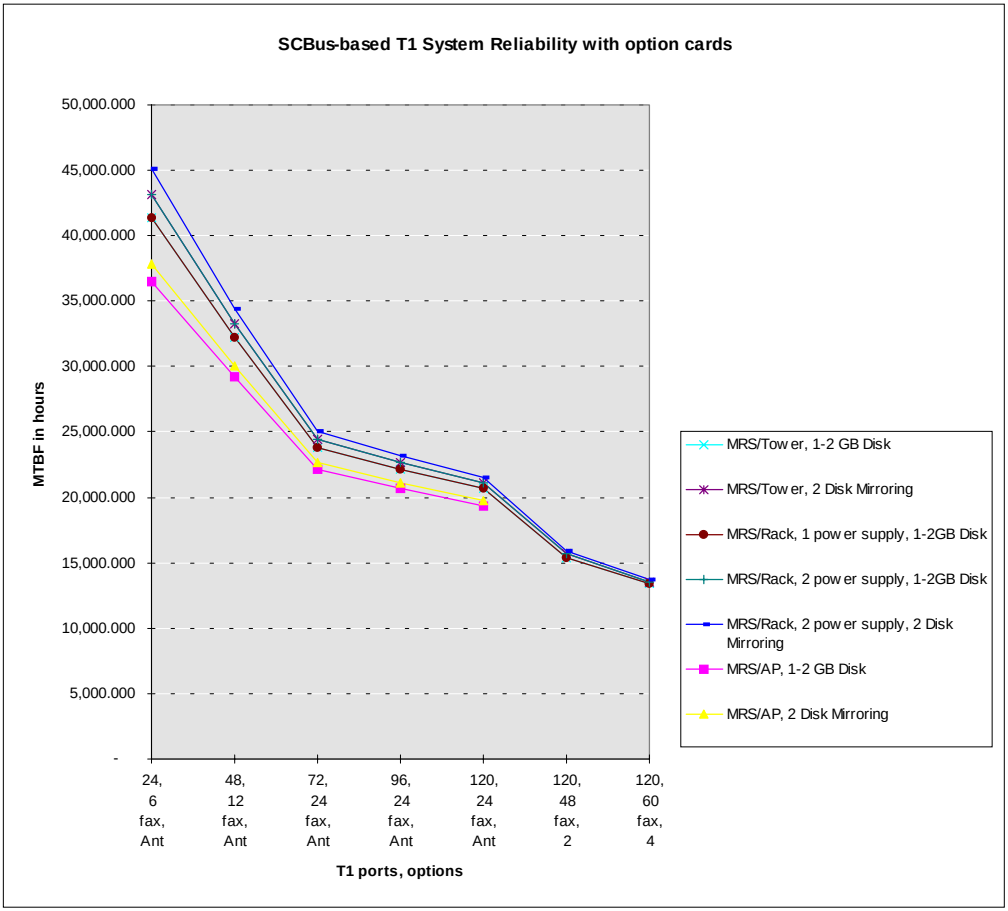


Figure 14-2: SCbus-based T1 system reliability *with* option cards



Glossary

This glossary provides definitions of many of the terms as used in this guide. Some of these terms may have additional meanings not described here.

acoustic coupler

A device (such as the Audio Interface Unit) used to interface between sound equipment and a port on the MRS/AP.

Administration Tools

A set of tools, accessible from the Symposium OPEN IVR Control Panel, used to configure and control the Symposium OPEN IVR system.

agent

A person whose primary role is to handle customer calls that are transferred from a queue within a call center.

ANI

Automatic Number Identification. A protocol implemented in some trunk cards that records the calling number.

ANSI

American National Standards Institute.

AP

Application Processor. A computer or workstation running the AP software in a distributed configuration. Symposium OPEN IVR combines one or more Multimedia Resource Servers (MRSs) with a general-purpose Application Processor (AP) to provide a versatile application development and run-time environment. The AP provides the environment for developing, managing, and controlling the IVR applications.

AP software

Nortel's premiere voice application development and management software package that runs on the Application Processor (AP). Application development capabilities are a licensed feature of AP software, through IVR Developer software.

application

1 In Symposium OPEN IVR, a customized program that controls activity on one or more telephone trunks connected to an MRS voice system.

2 On a host computer, any type of program that carries out a task.

application developer

A person who creates Symposium OPEN IVR 4.0 applications.

Application Editor

A utility used to graphically create or edit interactive voice response applications.

application processor

See AP.

Automatic Number Identification

See ANI.

branch

A pathway from one cell in an application to the next cell.

buffers

A part of computer memory used to store information from one cell and pass it to another cell.

call flow

A diagram of a Symposium OPEN IVR 4.0 application.

caller

A person whose phone call is received or originated by a Symposium OPEN IVR 4.0 application.

cell

The basic element of an application. Each cell causes some action to be performed—for example, playing a prompt to a caller. Each cell has a set of branches to other cells. After the cell performs its action, it determines which branch the application should follow to the next cell.

channel

1 A telephone trunk within a cluster of MRSs.

2 A path of communication between the AP and a communications or transmission facility. Channel sequences can span multiple MRSs, and their numbering starts at zero (0). Also referred to as a **port**.

CO

Central Office.

Control Panel

The Symposium OPEN IVR panel containing the buttons from which you can access the Administration, Information Database Editor, Report, Application, Prompt Management, and SmartHelp tools.

database

A collection of related information arranged for ease and speed of retrieval.

Dialed Number Identification Service

See DNIS.

DID

Direct inward dialing. A protocol used by some telephone equipment that allows callers to dial directly to an extension within a telephone system without going through a switchboard.

Direct inward dialing

See DID.

DNIS

Dialed Number Identification Service. A feature of 800 and 900 numbers, in which the number dialed or a portion of it is sent to the MRS and stored in the DIGITS buffer in OPEN IVR.

DTMF

Dual Tone Multi-Frequency. Touchtone (push button) dialing. DTMF is used to encode digits over analog telephone lines. Applications can collect information from callers by having them press telephone keys to create DTMF tones.

Dual Tone Multi-Frequency

See DTMF.

EXEC

The cell that executes an OPEN IVR application on the current channel.

falsing

A condition in which certain frequencies in a voice recording are incorrectly interpreted as DTMF tones. In some applications, false DTMF tones may cause the system to perform unwanted activities, such as selecting menu choices, terminating playback, or hanging up prematurely.

field

The specific location of information (data) within a record in a relational database.

gain

The increase in signal power, measured in decibels, when the signal is boosted by an electronic device.

ground start

A method of signaling on the trunk in which one side of the two wires (typically the ring wire) is momentarily grounded to obtain a dial tone. This type of signal is normally used with PBXs.

hook-flash

Depressing and releasing the plunger or handset-cradle on a telephone.

Host link

The ability of Symposium OPEN IVR to communicate with other host computers supported by one of the OPEN IVR gateway products.

Information Database

See database.

Information Database Editor

A utility used to create a message or information database, and to edit an information database.

IVR

Interactive Voice Response.

IVR Developer

A licensed component of AP software that provides application development tools to graphically create or edit interactive voice response applications.

loopstart

A method of signalling on the trunk in which a supervisory signal is given (by taking the phone off the hood). Loopstart seizes the line by bridging the resistance of the tip and ring wires of the telephone line to obtain a dial tone. Loopstart signalling is normally used for single lines or key systems.

MF tones

Multifrequency tones. These are tones used by ANI. Symposium OPEN IVR applications can receive and store MF digits when the ANI option is in use.

MRS

Multimedia Resource Server. Symposium OPEN IVR combines one or more Multimedia Resource Servers (MRSs) with a general-purpose Application Processor (AP) to provide a versatile application development and/or run-time environment.

MRS/AP

A single unit that runs a “folded” configuration; that is, a configuration that includes both the Multimedia Resource Server and the Application Processor. The MRS/AP contains the functionality of the other platforms, but in a single hardware unit.

MRS/Rack

A unit comprising a rack-mountable Application Processor and a rack-mountable Multimedia Resource Server. The MRS has an unfolded configuration interface with the AP via Ethernet or Token Ring. Multiple MRS/Racks can be installed in racks and stacked to take up less room.

MRS/Tower

The MRS/Tower platform is comprised of an Application Processor and a Tower Multimedia Resource Server. The MRS has an unfolded configuration interface with the AP via Ethernet or Token Ring.

multifrequency tones

See MF tones.

Multimedia Resource Server

See MRS.

node

A grouping composed of an AP (running Symposium OPEN IVR) connected to one or more MRSs.

parameter

A variable used to define the function of Symposium OPEN IVR cells. You set parameters in the parameter window for each cell (when using the Application Editor), or in the cell window (when using the character-based Application Editor).

PBX

Private branch exchange. A private phone system allowing communication within a business and between the business and the public telephone system.

port

A path of communication between the AP and a communications or transmission facility. Port sequences can span multiple MRSs, and their numbering starts at zero (0). Also referred to as a **channel**. *See also* trunk.

private branch exchange

See PBX.

prompt

A voice recording that helps lead a caller through a Symposium OPEN IVR 4.0 application.

Prompt Management tools

A set of tools, accessed from the Symposium OPEN IVR Control Panel, that is used to record, load, and update prompts.

record

1 To store sound on tape or disk for later play back.

2 In a database, a group of related data items (fields) treated as one item.

Reorder tone

A reorder tone is a fast busy or channel busy tone, which is applied 120 times per minute. The tone means that all switching paths are busy, all toll trunks are busy, there are equipment blockages, the caller dialed an unassigned code, or the digits dialed were scrambled.

Reports tools

A set of tools, accessed from the Symposium OPEN IVR Control Panel, that is used to generate reports about the system's activities.

Send Fax

See SFAX.

SFAX

Send Fax. Cell that sends one or more faxes to a destination fax machine.

SQL

Structured Query Language. A type of relational database.

Structured Query Language

See SQL.

subscriber

A person serviced by a voice processing application (such as voice mail).

system administrator

A person responsible for configuring MRSs, installing and running Symposium OPEN IVR 4.0 applications, managing prompts, and running reports.

Telco

Telephone company.

Terminal Resource Server

See TRS.

TRS

Terminal Resource Server. The Symposium OPEN IVR 4.0 process that manages the assignment of system resources to the Host Link products.

trunk

A communication line between two switching systems, frequently referred to as a port. Trunk numbering starts at 1.

voice storage number

See VSN.

VSN

Voice storage number. Internal numbering system used by the MRS for prompts, messages, and faxes (if the fax option is installed); Symposium OPEN IVR uses its own numbering system.

wink

A momentary interruption in single frequency tone that indicates the distant central office (CO) is ready to receive the digits that were just dialed.

X-Window Application Editor

See XAE.

XAE

X-Window Application Editor. Another term for the Application Editor.

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Symposium OPEN IVR

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